ELECTRICAL REVIEW

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VIEWS, NEWS AND INTERVIEWS.

J. B. Marston, superintendent of the Buffalo division of the Delaware, Lackawanna & Western Railroad, with headquarters at Buffalo, N. Y., has invented an electric live-bird trap, which consists of two wings enclosing a series of brass bars on which the bird stands. The wings disappear the moment the trap is released, and automatically the current is diverted into the bars on which the bird is standing, and the sensation is such as to cause the bird to fly at once. The certainty of the bird flying immediately will commend itself to any sportsman. In addition to the trap a new electric switch has been devised, rendering collusion between the trapper and the shooter absolutely impossible.

A daily newspaper, in speaking of some large transformers, says that "they are electrical mechanisms of 500 kiloworts."

Lieutenant Kennedy, the naval attaché of the Italian Government, was recently in New York city. In the course of a conversation with an American friend, he stated that the success of the electrical apparatus on our men-of-war has led the Italian Government to make plans for installing similar apparatus on its warships.

It is stated that a deserted and ruined house at Dartmoor, England, has been struck by lightning over 200 times. This is certainly a strong refutation of the old saying that "lightning never strikes twice in the same place."

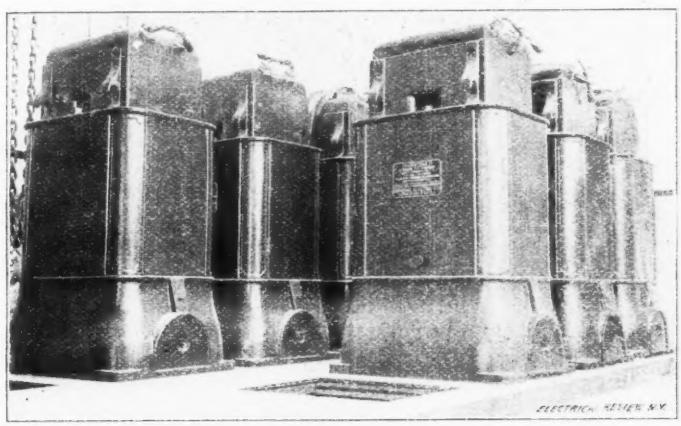
A local paper at Lancaster, Pa., states that James Shay, an electric lineman, had a startling experience the other afternoon. He was working on a pole of the city fire-alarm system when a wire broke, causing him to drop backwards. He was about 30 feet from the ground, and, as he turned head downwards, his death would have been certain had he made a clear drop. But he didn't. His climbing spurs supported him a few seconds, and the time was just long enough to enable him to grasp the legs of a fellow lineman, named Boas, who was immediately below him. The weight bore Boas down, but he clung to the pole, and the two men slid down to a cross-arm, where they hung in safety, none the worse for the adventure beyond a few bruises, but both a good deal shaken up in their nervous system.

Coming down on the trolley car the big, red faced man was talking for the benefit of all on board in telling of a little animal he had bought for his boy to drive, and dilating on its good points, says the Detroit *Free Press*. "Does it belong to the equus asinus family?" asked the scholarly and quiet appearing gentleman across the aisle. "No, sir; it belongs to me." "Same thing." And the red-faced man never turned a hair.

According to advices from South Africa, no sooner was the British flag floating over the ancient dervish capital than Mr. Cecil Rhodes at once took steps for expediting his scheme for a trans-African line of telegraph from Cape Town to Cairo. Mr. Rhodes's lieutenant, R. D. Mohun, has already left Bombay with an expedition, bound either for Zanzibar or Mombasa. The party will take advantage of the agreement lately come to between the promoters and the Congo Free State, and will construct a telegraph line from Lake Tanganyika to Stanley Falls, on the Upper Congo, the work being carried out under the commission of the state. W. Cavendish, the well known explorer, is already carrying the line northward, through the extreme northern territory of the Chartered Company, and it is confidently expected that he will form a connection with the Mohun line within the next two years.

Within a few weeks some experiments will be made over the wires of the Pennsylvania Railroad, which may have an important bearing on the methods of sending and receiving telegraphic messages. The experiments will be made with the multiplex device invented by Prof. Henry A. Rowland, of the Johns Hopkins University. By means of this invention it is possible to send eight telegraphic messages over the same wire at the same time, four in each direction.

It is reported that an American syndicate has purchased the railway line running from the center of San Juan, Porto Rico, through the only suburb to the village Rio Piedras, seven miles distant. The line is now operated by steam, but electricity will soon be substituted. Land concessions in connection with this short railway line have been secured by the same syndicate, which is also said to be considering other similar projects.



BUFFALO GENERAL ELECTRIC COMPANY'S NEW TRANSFORMERS FOR NIAGARA FALLS CURRENT.

Buffalo General Electric Company's New Light and Power Station.

Niagara power has been introduced to a considerable extent in and about the city of Buffalo, N. Y. The current is supplied for street-railway work to the extent of over 2,000 horse-power for the Buffalo Street Railway Company alone, while a large amount of power is utilized by the Buffalo & Niagara Falls line and the new electric railway over the old Erie track between Buffalo and Lockport.

Within the city limits the power is distributed by the Cataract Power and Conduit Company, who have adopted the plan of building terminal and transformer houses in various parts of the city, at which points the current is reduced from 11,000 volts, the present high potential used on the line from Niagara Falls to Buffalo, to 2,000 or lower, at which pressure the consumer receives the current, and it is again changed to a direct current or an alternating current of the desired voltage and frequency.

The power line has at present six conductors, three of which are taken in at the top of the new terminal house or transformer building at the north end of the city in Black Rock. This terminal building is the point at which the current is taken from the pole line and carried through underground conduits to the various parts of the city. At first it will probably be utilized only as a terminal house, but it has been designed for and will probably soon be equipped with step-down static transformers of the type shown in the illustration, and used by the Buffalo General Electric Company, although the oil and water circulating type now used in the Ohio street transformer station may be adopted. All that section about Black Rock will undoubtedly be supplied from the transformers at this terminal station.

The high-tension conductors supplying the various transformer stations and the light and power-stations of the Buffalo General Electric Company are carried through the vitrified

clay conduits manufactured by the H. B. Camp Company, and laid through Niagara street to the new power and lighting station of the Buffalo General Electric Company and the Ohio street transformer house of the Cataract Power and Conduit Company. From the latter building several thousand horse-power are being delivered to the Great Northern elevator, the Electric Elevator, the Union Dry Dock Company and at the freight-houses, where alternating motors are utilized for conveying freight from the boats into the freight-houses.

The Niagara current is received at the new Buffalo General Electric Company's plant at 11,000 volts pressure, and by means of the static transformers shown in the illustration, is lowered in voltage and conducted to the various synchronous motors and rotary converters now being installed at the new station.

Several of the large 200-kilowatt static step-down transformers are now in place, and spaces provided for a large increase of capacity. A total capacity of over 7,000 horse-power will be provided for supplying current in Buffalo for arc lighting, incandescent lighting and commercial electric motors of small sizes over the lines of the Buffalo General Electric Company.

At present there are being installed for lighting the streets of Buffalo with arc lights one of the most complete and modern plants in the country. Twelve Brush arc machines of a capacity of 125 lights each are being connected up in the new station, one on each side of a synchronous motor directly connected to the shaft of that motor and upon the same base. Other arc machines now being driven by steam power in this city will be operated by motors in the near future.

Several 75-kilowatt, 250-kilowatt and 500-kilowatt rotary converters and motor generators will be supplied with current from the static transformers shown in the illustration, and deliver to the feeders of the company direct currents of 110 and 500 volts for operating motors in the immediate vicinity and upon the commercial power lines at present existing; also alternating currents of a higher frequency than the Niagara current for incandescent lighting for the resident and business districts.

The Buffalo General Electric Company and the Cataract Power and Conduit Company have an existing set of rates such that none can afford to utilize other than electric power, which for its cleanliness, ease of manipulation and economy of operation is beyond comparison with other sources of power and light, and will insure the immediate introduction of electrical energy into the residences and business houses in the city of Buffalo.

TELEPHONE NEWS AND COMMENT.

It is proposed to install a mutual telephone system at Ilion, N. Y.

The Interstate Telephone Company is building a line between Frederick and Libertytown, Md.

It is reported that twenty-five local telephone companies in eastern Kentucky will consolidate their interests.

Conversation over the long-distance lines between Boston and Kansas City, a distance of 1,560 miles, is clearly audible and the service is in commercial operation.

The Union Suburban Telephone and Telegraph Company, of Cleveland, Ohio, has received permission to change its name to the United States Telephone Company.

The telephone cable has been laid between Charleston, S. C., and Mount Pleasant, and very soon the people of that city will be within "talking distance" of Mount Pleasant, Sullivan's Island and the Isle of Palms.

The Rocky Mountain Bell Telephone Company has issued a list of cities and towns reached by its long-distance lines in Utah, Idaho, Montana and Wyoming. These are also in connection with the Inland Telephone Company, Oregon Telephone Company and Sunset Telephone Company, the three companies named connecting all the prominent places in Washington, Oregon and California. The list is prepared in pamphlet form and contains the company's tariff rates as of October 1, 1898, a list of exchanges of the Rocky Mountain Bell Telephone Company and a map of its territory.

Charles McCaul has been granted a permit to erect the new telephone exchange building at Berks and Hope streets for the Philadelphia Bell Telephone Company. This building will be of brick and granite, two stories high, and 31 by 70 feet in dimensions. Work will be started at once, and the cost is estimated at $20,000.

FIG. 1.—"THE NEW STATION OF THE UNITED STATES ELECTRIC LIGHT COMPANY AT WASHINGTON, D. C."—A VIEW IN THE BOILER-ROOM.

William J. Atkinson, who is identified with the Home Telephone Company, was arrested in Jersey City, N. J., on October 20, on a capias issued by a Baltimore court on a charge of "corporate misrepresentation."

The United States Supreme Court has declined to advance the case of the city of Richmond, Va., against the Southern Bell Telephone and Telegraph Company. It will not, therefore, be reached before March or April of next year.

The American Telephone and Telegraph Company (long-distance system) was extended to Barnesville, Ohio, last week by the Central District and Printing Telegraph Company, of Pittsburgh. The event was celebrated by the citizens of Barnesville, who assembled in Bradfield's Hall, Tuesday afternoon, and talked over the long-distance lines east and west. One of the places called up was the office of the ELECTRICAL REVIEW, where a member of its staff conversed with a number of old-time friends in this beautiful little city of eastern Ohio. The affair was under the management of Superintendent Wolff, of Wheeling, and was very successful.

A La Crosse, Wis., press dispatch states that the La Crosse Telephone Company has been the nucleus about which has gathered all the anti-Bell movements in western Wisconsin and southern Minnesota. Some weeks ago a deal was perfected whereby the Northwestern Telephone Exchange, with headquarters in Minneapolis, which is the Bell company in Minnesota, purchased some several thousand miles of independent toll lines, connecting 800 towns and cities in Minnesota, Iowa and Dakota. The La Crosse company has just perfected a traffic agreement with the Standard Telephone Company, with headquarters at Britt, Iowa, another independent concern, whereby practically all of its former western connections are regained, and many new towns have been added to the toll-line lists. A flat rate of 15 cents for five-minute talks to any point on the new system has also been inaugurated, and this is expected to start a rate war.

A Pleasant Electrical Social Gathering.

On the evening of October 25, a pleasant social gathering of electrical gentlemen and their wives, from New York, Philadelphia, Boston and Connecticut, occurred in New York city. A party of 72 attended the performance of "The Fortune Teller," at Wallack's Theater, afterwards being conveyed in electric cabs to the Waldorf, where a supper was served in a suite of rooms especially engaged for the occasion. The affair was so successful in every respect that it was determined to form a permanent organization. The committee in charge of the function has been delegated to perfect the details of organization, and was composed of the following: H. W. Baker, chairman; John H. Dale, treasurer; H. B. Kirkland, secretary; F. W. Harrington, E. S. Keefer and John T. McKever, Jr.

Mr. Frank N. Phillips, president of the American Electrical Works, will be married to Miss Edith R. Peck, and the wedding reception held at Providence, R. I., Tuesday evening, November 15. Mr. Phillips has a host of friends, and one and all will congratulate him. The ELECTRICAL REVIEW most cordially joins with the chorus of well wishers.

THE NEW STATION OF THE UNITED STATES ELECTRIC LIGHT COMPANY AT WASHINGTON, D. C.

A MODERN AND COMPACT PLANT JUST COMPLETED.

The United States Electric Light Company, of Washington, D. C., has just completed the transformation from what was one of the most promiscuous collections of electrical apparatus in the country to what must be considered one of the most compact and complete stations of its kind. The work has been done in its entirety (the building and plant) by Sargent & Lundy, through the able management of Mr. C. L. Lenz, their engineer in charge. Several illustrations of the new station are presented herewith.

The United States Electric Light Company is an old one, having been organized October 17, 1882, under the laws of West Virginia, Mr. E. A. Thomas being the president; Mr. Jas. L. Morris, vice-president; Mr. Seymour W. Tullock, secretary, and Mr. E. S. Marlow, treasurer and acting superintendent. The company operates the three-wire system, the alternating system for outlying districts and series arcs. There is connected with the station 70,000 incandescent lamps, 700 incandescent arc lamps, 3,000 alternating incandescent lamps and 800 series arc lamps, besides 1,700 horse-power capacity of power motors. They also supply the Washington & Mount Vernon Railway Company with 260 horse-power capacity from a storage battery.

It may not be generally known that almost all power, alternating and incandescent lines in Washington city are placed underground and are giving general satisfaction and good service. The United States Electric Light Company have 43⅓ miles of underground conduits and 147 miles of underground cable, comprising three alternating power circuits, series arc and incandescent conductors.

The old station-room formed a hollow E, and the equipment was made up of small and great elements—great in their day. The new station is built of brick with ample head room, the interior is fitted with a traveling crane and is splendidly ventilated and lighted. The building is fireproof and the floors are of cement. A view of the exterior of the new station from the southwest is given herewith. In the view of the switchboard the arc portion is at the left and the incandescent portion at the right hand side. Fig. 1 is a good view of the boiler-room, showing the stokers and coal bins.

The life of the plant, the boiler-room, is separated from the station by a brick wall. The boiler equipment is composed of six Babcock & Wilcox water-tube boilers, arranged in three batteries of two boilers each. Each boiler has 3,021 square feet of heating surface, with a normal rating of 375 horse-power, and a maximum capacity of 525 horse power. The boilers are steel throughout, all fittings being steel forgings. The only piece of cast-iron used is the heads of the mud drum. The Babcock & Wilcox chain grate stoker is fitted to each boiler and is operated by a small auxiliary steam engine. Each boiler has an effective grate area of 48 square feet.

The coal is taken in at the basement, crushed and elevated to coal bins and conducted from the bins to the grate hopper, by means of hand-operated chutes.

The coal elevator also hoists the ashes to an ash bin to be hauled away.

A natural draft is supplied by a smokestack 10 feet diameter at the top, 10 feet 9 inches at the bottom, made of steel, and fire-brick lined throughout. The stack is 204 feet high supported on a substantial foundation and pier.

The station equipment consists of two 550-horse-power McIntosh & Seymour compound horizontal condensing engines, with cylinders 16x34x30 inches, running at 150 revolutions; each independently connected to a pair of 240-kilowatt General Electric generators rated at 1,500 amperes at 160 volts, the two being connected in series.

One 1,100-horse-power engine, running at 120 revolutions, is direct-connected to a pair of 240-kilowatt generators, and belted to a line shaft arranged to connect or disconnect from the line shaft by means of a friction coupling, the driving pulley running loosely on a quill bushing placed over the line shaft.

One 1,100-horse-power engine is direct-connected to a pair of 480-kilowatt dynamos with 3,000 amperes nominal capacity at 160 volts, running at 120 revolutions. This engine is arranged to connect to or disconnect from the line shaft. To the line shaft, which is itself in two sections, are belted eight No. 12 Brush 125-light dynamos and two alternators; one a No. A 120 Thomson-Houston and one a No. A 70 Thomson-Houston generator.

The shaft may be driven as a whole either by the 240 set or the 480 set, or one-half may be driven by each engine.

The day alternating load will be carried by a water driven alternator.

In addition to the dynamo equipment, there is provided a pair of motor-driven boosters, General Electric type, of 750 amperes capacity each, to be run as a pair, connected in series to the three-wire service, to assist during heavy loads.

The switchboard occupies one end of the station and controls all the arc, alternating incandescent, three-wire incandescent and power circuits.

CENTER AND NORTH WING OF POWER STATION. INTERIOR OF NEW STATION.

AN EXTERIOR VIEW OF THE NEW STATION. A VIEW OF THE NEW SWITCHBOARD.

FIG. 2.—"THE NEW STATION OF THE UNITED STATES ELECTRIC LIGHT COMPANY, AT WASHINGTON, D. C." EXTERIOR AND INTERIOR VIEWS.

Wooden Electrodes Explained by Dr. Monell.

To the Editor of Electrical Review:

Your editorial note to my letter on "Asthma" in the Review of October 26, prompts me to add an explanation which may interest both you and your readers, for I find that many electrical students and engineers are eager to inquire about static machine work. In quoting from my book, you stop just short of a full understanding of "conductors." The same paragraph remarking that: "All electrodes require a conducting surface and attachment to a conductor," goes on to say that "static electrodes are grounded to the earth" (p. 45). Pages 52 and 53 describe and illustrate static electrodes. Electrodes numbers 4 and 5 from the top are the wooden electrodes which "caused your astonishment." "Wood is usually classed as a non-conductor," with galvanic and faradic currents, and is not used in electrodes which are applied directly upon the skin or tissues of the body. The low electro-motive force of galvanic and faradic medical currents compels us to use the best possible conductors for electrodes, and familiarity with this fact puzzles you about the use of "wood."

Well, there is no mystery about it. The high electro-motive force of the electric charge from a large static machine (an electro-motive force estimated at from 500,000 to 1,000,000 volts when the plates are in rapid motion) enables me to not only treat patients through all their clothing, and without contact with the tissues, but breaks down the insulation of wood and several inches of air gap. Even glass and vulcanite will conduct some of this current over their surface, as I daily demonstrate in my clinical school of instruction. When, therefore, a wooden ball or point is connected to the earth with the usual chain via the gas or water pipe, and the patient is charged with a high potential, the approach of the "wooden electrode" to within six, four or two inches of the chest will demonstrate the law that "opposite electricities attract each other," and the discharge between the patient and the electrode is a convective "spray." When the electrode is managed properly a fine counter-irritation and tonic action is set up. It is all rational electro-therapeutics. Yesterday five physicians examined a case of asthma before and after a static treatment. The pulse was slowed and strengthened, the superficial and rapid respiration was slowed and deepened, the wheezing was rendered almost inaudible to auscultation, the nasal irritation was reduced, and a general benefit obtained that none of those present had ever witnessed before as the result of medicine.

The relief obtained by one treatment will last but a few hours, but a regular course of treatment will average very satisfactory results, even in cases where the best medical treatment has disappointed. The fact that wood was a poorer conductor than metal was the original reason for its use as a static electrode. It was deemed to produce a milder current action. Improved skill in technique, however, disposes of that ancient theory and the historical wooden point is no "milder" than a brass point if you are trained to the use of both. It is the high potential of the static machine current which makes the "wooden electrode" possible.

S. H. Monell, M. D.

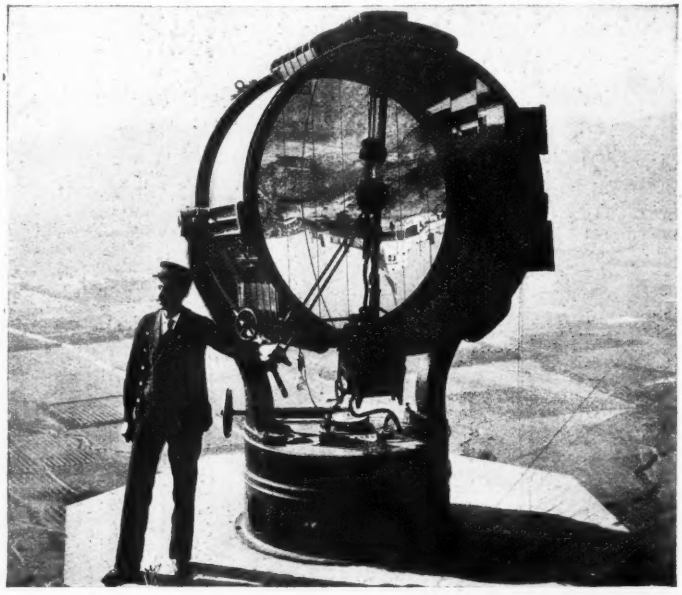
Brooklyn, October 27.

American Institute of Electrical Engineers.

The 128th meeting of the institute was held at 12 West Thirty-first street on Wednesday, October 26, President Kennelly in the chair. A paper was read by Mr. A. A. Knudson on "An Electrical Survey in the Borough of Manhattan, New York City." The discussion was opened with a communication from William Maver, Jr., and continued by Townsend Wolcott, Jesse M. Smith and others.

The president announced that a committee on co-operative research had been appointed in accordance with the instructions from council. The committee consists of Dr. A. E. Kennelly, chairman; Prof. W. A. Anthony, Dr. F. B. Crocker, Dr. C. T. Hutchinson, Dr. Samuel Shelden, Chas. P. Steinmetz and Prof. E. Thomson. The purpose is to formulate a system of experimental research by submitting to various colleges and universities various problems which are of practical importance. The investigations are to be made as a part of undergraduate, graduate or post-graduate work, under competent supervision. The committee starts off with a list of 16 subjects and will expect members to send in others which may occur to them in the course of their practice. The results when received, if deemed important, will be published in the transactions. The plan is receiving hearty support.

At the meeting of the executive committee in the afternoon the following associate members were elected: John McL. Murphy, electrical engineer, Safety Third Rail Electric Company, 5 Beekman street, room 223, New York; F. K. Vreeland, second assistant engineer, Crocker-Wheeler Electric Company, residence, 228 Orange Road, Montclair, N. J.; J. E. Woodbridge, editor *Electrical World*, 9 Murray street, New York. The following associate members were transferred to membership: C. H. Wordingham, city electrical engineer, Manchester, England; William Stanley, electrical engineer and inventor, Pittsfield, Mass.



The Great Searchlight on Mount Lowe, the Largest in the World.

The Great Searchlight on Mount Lowe.

All European travelers will recall with pleasure the charming effects obtained at the mountain resorts in Switzerland by turning flashlights of colored rays on nearby mountain cascades. At the summit of Mount Lowe, in California, this idea is applied on a scale and under atmospheric conditions never before available. The gigantic searchlight, which was placed on the top of the Liberal Arts Building, was one of the well remembered sights of the World's Fair. As its rays were projected up to the northward on the passing steamer or on the merry crowds of the "Midway," it constituted an unfailing source of comment and awakened endless curiosity, but it is doubtful if the inventor of that appliance himself had any idea of the latent possibilities of his instrument under conditions such as obtain at the summit of Mount Lowe.

Until this great searchlight was established in its present location its powers could not be brought out, on account of its location so near the general level of the surrounding country. Here, however, it is so located that its rays can be seen for 150 miles out on the ocean, and the most distant mountain peaks can be made visible. The beam of light is so powerful that its full sweep illuminates the peaks of mountains which are hundreds of miles apart.

It is of 3,000,000 candle power, and stands on a wooden base, built in octagon form, which has a diameter of about eight feet. The searchlight itself stands about 11 feet high, and its total weight is 6,000 pounds, yet it is so perfectly mounted and balanced that a child can move it in any direction.

The reflecting lens is three and one-fourth inches thick at the edges and only one-sixteenth of an inch thick at the center, and weighs about 800 pounds. The metal ring, in which the lens is mounted, weighs about 750 pounds, the total weight of lens, ring and cover being about 1,600 pounds. This great mirror is mounted at one end of a big drum, the outer end of which is furnished with a door, consisting of a narrow metal rim, in which are fixed a number of plate-glass strips five-sixteenths of an inch thick and six inches wide. We are indebted to the *Scientific American* for the accompanying illustration and data.

The Baltimore & Northern Electric Railway Company, of Baltimore, Md., has put an express system in operation over its line.

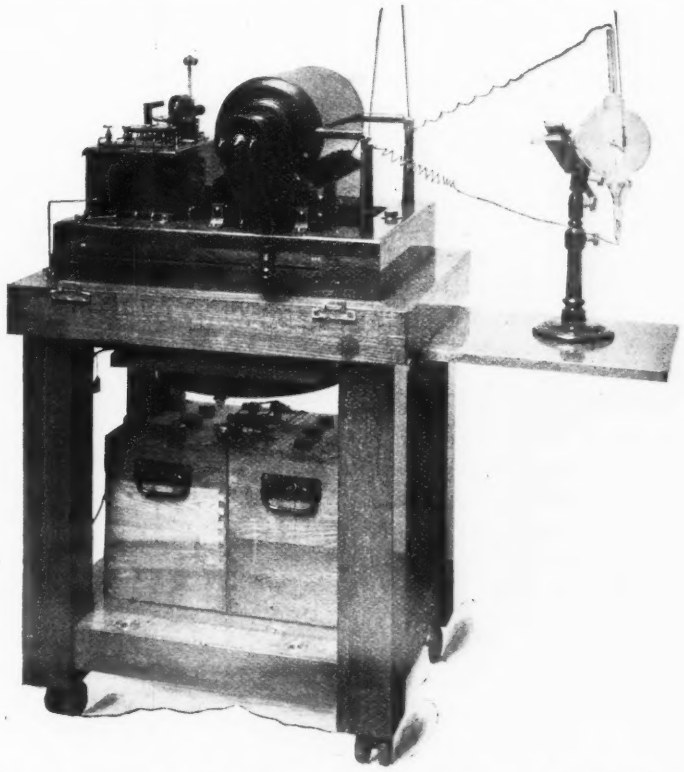
The X-Ray Apparatus of the United States Army Hospital Ship "Missouri."

We illustrate on this page the X-ray outfit made by Messrs. Queen & Company, of Philadelphia, for the United States Army hospital ship "Missouri." This vessel was equipped by the medical department of the army to assist in conveying wounded soldiers from Cuba and Porto Rico to hospitals in the United States, and was fitted out with the best and most modern appliances for their care and treatment on board. As there was no X-ray apparatus either in Cuba or Porto Rico, it was of special importance that this department should be well equipped.

The outfit presents several novel features made necessary on account of the unusual conditions under which it is to be used. The table supporting the coil is especially heavy and bolted together so that the vibrations and rolling of the vessel would not strain it in spite of the heavy load which it had to carry. It is mounted on casters so that it can be moved if necessary. As permanently set up on the vessel it is held in position by six heavy brass bolts, which screw into lugs fastened securely in the deck. The coil is bolted by similar bolts on to the table, and is prevented from any possible sideway motion by a heavy rim of oak running around the top of the table.

As the vessel was provided with a 110-volt, direct current dynamo, the apparatus was designed to run on this circuit; but to provide for an emergency, when the dynamo, on account of break-down or for other reasons, might not be running, the outfit was also provided with storage batteries. These necessitated the use of two rheostats in circuit with the primary of the coil and a primary winding in two layers, which could be used in multiple for the battery circuit and in series for the 110-volt circuit. The apparatus was so designed that, to change from the battery to the 110-volt circuit, it is only necessary to throw over two double-pole switches, which are situated on top of the table, but not shown in the cut. Two binding-posts also (not shown in the illustration) are arranged for connection with the 110-volt circuit. Aside from this no connections were necessary, as another switch controlled the charging circuit for the storage batteries, and this circuit was so arranged that the batteries could be charged either while the 110-volt circuit was being used or while the battery circuit was being used.

The coil embodies the company's most recent improvements. The spark points are set out at a distance of about 10 inches from the primary and the coil terminal, carried out in very heavy walled hard rubber tubing. The length of the spark gap is controlled by a lever and by means of the rheostat, the handle of which shows in the illustration. The length of the spark can be controlled between one inch and 12 inches, the full output of the coil when running either on the battery or the 110-volt circuit. The outfit was completed with a number of the Queen self-regulating X-ray tubes, a large fluoroscope, a large stand and tube-holder, and a complete outfit of the necessary photographic material.



X-RAY APPARATUS ON THE UNITED STATES ARMY HOSPITAL SHIP "MISSOURI."

Bradford, Vt., Electric Lighting Company.

At the annual meeting of the Bradford, Vt., Electric Lighting Company the following board of directors was elected: Wm. F. Allen, H. E. Parker, B. S. Hooker, Charles Jones and Geo. A. Dickey. B. S. Hooker was elected auditor. At a meeting of the directors following that of the stockholders Wm. F. Allen declined a re election as president and H. E. Parker was chosen to the position; B. S. Hooker, first vice-president; Wm. F. Allen, second vice-president; Charles Jones, treasurer and general manager; Geo. A. Dickey, clerk.

Steam Distribution in Connection With Electric Plants.

During the past season—the Summer season of construction—an unusually large number of cities and communities have adopted the Holly underground system of steam transmission. At the present moment a system, which, when completed, will be one of the most elaborate ever installed, is being hastened, before the Winter season, into the streets of Quincy, Ill. When this installation is finished it will entail 18,000 feet of main, and will be used both for heating and power. The J. Hubinger company, which are now building a new electric light system for that city, in addition to the one already there, are to operate the steam-distribution equipment in connection with the new plant. These mains will be carried through the principal streets of Quincy and furnish steam at a minimum cost, thus doing away with numerous isolated heat and power plants. In the Quincy installation, mains eight inches to 24 inches in diameter are being used. These mains consist of wood logs enclosing iron piping, with a space between for confined air for the lessening of radiation. These logs are lined with tin, and within that is a layer of abestos covering. At Erie, Pa., another installation is being completed, which will convey steam from the plants of the Merchants and Manufacturers' Electric Company (the city's lighting plant), and also from the power-house of the Erie Motor Company (the street railway company). The Erie plant will have about 8,000 feet of 12 inch main. At York, Pa., a plant has recently been completed for the Edison Electric Company, which has between 6,000 and 7,000 feet. Also at Seneca and Hornellsville, N. Y., installations have been perfected during the season.

The American District Steam Company, of Lockport, N. Y., control the patents for this system and place the equipments under the guidance of their own engineers.

Electric Scene Shifting Apparatus.

A London contemporary states that extensive appliances are being installed at Drury Lane theater for moving the scenery by means of electrical power. This will be the first attempt of the kind made in England. The work is due to the initiative of Mr. E. O. Sachs, and is being carried out with activity and enthusiasm by Mr. Arthur Collins. Another paper devotes a column to a preliminary description of the methods to be employed and to the marvelous results likely to be obtained. Among these latter there will, naturally, but unfortunately, be one which will darken a good many humble homes, for, to quote our contemporary:

There is no greater contrast, perhaps, than the working of a spectacular play on a modern stage as compared with the old-fashioned one. Literally, where Drury Lane, say, requires 150 men, or the Lyceum 75, a dozen or half a dozen should suffice: and whatever may be the capital outlay after due allowance for locking the money up and for depreciation of plant, the interest on the pounds, shillings and pence sunk is a small item compared with the annual aggregate of those innumerable half-crowns for the day-men, night-men and other odd helpers who crowd the stage.

Telephone Construction in the West.

The fact brought out by the Erie company's purchase, that independent telephone companies had succeeded in building over 3,000 miles of toll lines in the northwest, was somewhat of a surprise to investors in telephone shares in New England, who are not aware that the independent telephone movement had gathered such an impetus.—*Boston News Bureau.*

A very extensive system of telephones has been constructed of modern apparatus and of a lasting nature throughout the middle, western and southern states.

Electrical Review

[OLDEST ELECTRICAL WEEKLY IN THE UNITED STATES.]
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Mr. Tesla's invention for transmitting large amounts of electric current through the rarefied air surrounding the earth, described in last week's ELECTRICAL REVIEW, has attracted a great deal of attention, and our article has been quoted in the lay and technical press all over the world. We present in another column a communication from an electrical engineer, calling attention to another interesting phase of the same matter.

ELECTRICITY ON WARSHIPS.

For a long time the ELECTRICAL REVIEW has consistently advocated the use of electricity on war vessels for performing many operations heretofore and now accomplished by hydraulic, pneumatic and steam power. The advantages of the electric current over any other form of power used on shipboard for auxiliary services are obvious and paramount even to the casual observer.

We are glad to note that our advocacy has achieved practical results. Ever since the battle at Santiago, on July 3, when Admiral Sampson's ships were tested to their full value in actual warfare, the ELECTRICAL REVIEW has received at intervals correspondence from officers who were in that engagement commenting favorably on the performance of the electrical apparatus in service on many of our ships. We have also been informed of several accidents to hydraulic apparatus which, had it not been for the alertness, steadiness and bravery of the officers and their men, might have resulted in serious consequences.

That the advantages of electric power are now appreciated in high and influential naval precincts is shown in the annual report of Capt. Charles O'Neil, chief of the Bureau of Ordnance, one of the most important bureaus in the Navy Department. In Captain O'Neil's report, just submitted to the Secretary of the Navy, this passage occurs:

Experience has shown that guns in turrets operated by electric power can be laid upon more accurately and made to follow a moving target than when operated by steam, hydraulic, or pneumatic power. There are no water pipes to freeze, no steam pipes to burst, and no delay in obtaining a full working pressure, and no troublesome or noisy exhaust pipes to deal with. A burned-out fuse can be replaced quickly or a broken wire repaired, and as the wires can be led below the armored deck there is little liability of the latter becoming necessary.

Line officers of the navy are in favor of electricity because of the reasons advanced by Captain O'Neil. Engineer officers advocate the electric current because an electric system is much easier of operation and repair than a hydraulic or pneumatic system, with its pumps and intricate mass of piping, which is often difficult and sometimes impossible to install below the protective deck, where auxiliary apparatus of such great importance naturally belongs.

The United States is now building a number of the most formidable and modern war vessels in the world. It seems safe to assume that, with our recently acquired war experience and the enlightened ideas now prevailing in the various naval bureaus, our new ships will be thoroughly and as completely equipped electrically as good judgment and professional skill will permit. The electrical industry has cause for congratulation on this important bit of progress.

NO WELSBACHS FOR WHITESBORO, N. Y.

At a special taxpayers' election held on October 24 to determine whether Welsbach lights or electric lights should be used to illuminate the streets of Whitesboro, N. Y., four miles west of Utica, under a new contract about to be let, the Welsbach people were defeated by a vote of over four to one, and the contract was awarded to the Utica Electric Light Company for a term of five years. The electric light company has illuminated Whitesboro with arc lights for the past five years.

A Welsbach promoter was on the ground for six weeks previous to the letting of the contract and had a few sample lamps burning. He claimed that Welsbach lighting would be, in one instance, $4,700 cheaper when the electric lights were to burn not later than 1 A. M., and $11,694.50 cheaper when the electric lights were to burn all night. Circulars containing these statements were issued by the Welsbach Street Lighting Company of America, but the Utica Electric Light Company did not even take the trouble to answer them. The voters, after spending some time in investigating the matter for themselves, settled the question by ballot, and the result would seem to indicate that they did not care to install Welsbach lights in their streets at any price. The electric light company made no further effort to get the contract than to submit a bid.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The market during the week was unusually steady and numerous advances were noted at intervals. Money is especially plentiful, and a sharp rise is expected when the result of the elections is determined.

General Electric closed at 81½ bid and 81¾ asked, a gain of ¼ point. Western Union closed at 92¼ bid, 93 asked.

The board of directors of the General Electric Company at its meeting on October 24 declared a dividend of $11.66⅔ per share on the preferred stock of the company, as reduced, payable on and after November 15, 1898. The transfer books of the preferred stock will be closed at 12 M. November 5, and will be reopened November 16.

This dividend which is equal to $7 per share on the preferred stock as it existed prior to the reduction, is on account of the unpaid accumulated dividends on the preferred stock, and is equivalent to one year's dividends at the rate of 7 per cent on the unreduced preferred stock.

The entire amount of the unpaid dividends on the preferred stock from July 1, 1893, when the last dividend was paid, to August 17, 1898, the date of the reduction of the capital stock, amounts to $1,527,885, which is $59.89 upon each share of the reduced preferred stock.

It is said to be the intention of the board to apply so much of the surplus net earnings of the company as have accrued since the impairment of the capital stock was cured by the reduction of the stock, August 17, 1898, as is proper, to the payment of the unpaid accumulated dividends on the preferred stock, until the same are paid in full, and also to pay the current dividends on the reduced preferred stock. These latter will be at the rate of 7 per cent per annum from August 17, 1898, on the reduced amount of the preferred stock.

Wall Street, October 29.

The recent reduction in rates for electric current supply by two of the prominent central stations in New York city has caused joy to the citizen and consternation among the gas companies.

Tesla's Aerial Power Transmission.

To the Editor of Electrical Review:

This end of the century has been so replete with scientific discoveries, both electrical and otherwise, that the old motto, *nil admirari*, becomes revivified, and truly we wonder at nothing.

When one reads the account of Mr. Tesla's latest work in electric power transmission the mental question arises, "and why not?" Once he had accomplished wireless telegraphy, to his restless activity it was but a step to wireless transmission, merely devising ways and means for transmitting wagonloads instead of thimblefuls.

Nature herself has done this in what is probably her most awe-inspiring manifestation of power, the lightning. Who has not seen the tremendous bolt dart from one end of a long cloud to earth and at the other end flash back from earth as the "return stroke?" And who will say the cloud, though many miles in length, has not constituted an aerial circuit in such case?

It is my belief that the upper strata are constantly carrying electrical currents of high potential.

An old-fashioned apparatus for the study of electrical phenomena was a globe of sulphur or glass, which, when rotated under slight friction of the dry hands, produced the desired effect in the shape of a snappy spark. Such a globe was about one foot diameter. What, then, should be the effect of the earth rotating at its enormous speed under the friction of the atmosphere—a globe billions of times the surface of the archaic electric machine?

It is no wonder that our most advanced meteorologists go astray in their forecasts, when they have no means of learning what is going on in the upper strata.

Tesla's balloon terminals may prove a boon to meteorology, while serving their own purpose also; for they can be used as a source of information of the various phenomena continually taking place above us. And, as the Electrical Review has often pointed out, meteorology will never reach the pedestal of an exact science till observations are regularly conducted at an elevation consistent with the conditions.

There is nothing inconceivable in Tesla's transmission scheme, wonderful as it may seem; on the contrary, it is consistent with all that has gone before. He has simply gone after tarpon when others have been content with sprats. T. J. M.

New York, October 29.

John Stephenson Company in Receivers' Hands.

Great surprise throughout the electrical industry and the general business world was occasioned by the failure last week of the John Stephenson Company, manufacturers of street cars in New York city. The company is the oldest in its line of business, and built the first street car ever used. On the affidavits of President Davis and Secretary Delamater to the effect that the concern was temporarily embarrassed, Justice Cohen appointed Albert A. Wilcox, of Paterson, N. J., and Louis Stern, of New York, receivers for the company, under bonds of $100,000 each.

The assets are placed at $1,175,776, and the liabilities at $788,782. The reason for the failure at this time is said to be that the company's working capital is tied up in a new plant now under construction at Bayway, near Paterson, N. J. It is expected that the original capital of the company, amounting to $150,000, will be increased, and that the company will be reorganized. The business was founded by the late John Stephenson, who died in 1893.

Import Duty on Incandescent Lamps.

The Board of Classification of the United States General Appraisers last week announced a decision regarding the tariff on incandescent electric lamps. The collector at the port of New York assessed a duty of 60 per cent ad valorem, under paragraph 100, act of 1897, which covers various articles of glass, or of which glass is the material of chief value, and blown glassware. A protest was filed by the importers, Knauth, Nachod & Kuhne. The board holds that while glass is the component material of chief value, yet the other materials, carbon filament, porcelain, metal and cement are so essential to the character of the lamp that it ceases to be merely blown glassware. The board holds further that the goods are covered by paragraph 112, which includes manufactures of which glass is the component material of chief value, not specially provided for. The protest is sustained and the duty fixed at 45 per cent.

OBITUARY.

Clarence G. Davenport, formerly expert and agent of the General Electric Company, at 44 Broad street, New York city, who went to Porto Rico with the First Regiment Engineers, U. S. V., died of typhoid fever at Ponce on October 26. He had been an associate member of the American Institute of Electrical Engineers since November 21, 1894.

ELECTRICAL SURVEY IN THE BOROUGH OF MANHATTAN, NEW YORK CITY.

SHOWING RESULTS OF STRAY CURRENT MEASUREMENTS BETWEEN ELECTRIC RAILWAYS, UNDERGROUND PIPES, ETC., ALSO RESULTS OF TESTS ON THE BROOKLYN BRIDGE.

A PAPER READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, NEW YORK, OCTOBER 26, 1898, BY A. A. KNUDSON.

The corrosive effect of straying currents upon underground metallic structures is now so well known and understood that obviously there is no need to dwell upon this fact as a reality, but rather it is the purpose of the author to show from actual tests, some of the locations and characteristics of the stray currents in New York city.

About eighteen months ago the question was raised by some of the municipal officers of this city as to the possibility of electric currents leaking or straying to underground pipes from the conductors of the "open conduit" electric railway on Lenox avenue, and adjoining streets at that time, as applications had been made to extend this system.

This matter was investigated at that time by the author, and some of the results becoming known to one of the officers of this institute, he suggested that with some additional tests and the whole presented in a paper, it would prove of interest to the members and perhaps throw further light on this interesting subject.

I have since made a number of additional tests throughout the city, from Harlem River to the Battery, between various metallic structures such as "L" (elevated railway) pillars, surface railways, water pipes, etc., and give the results here, trusting that they may prove acceptable, and possibly of some value.

Previous to making any tests on the Lenox avenue line, we had a well settled theory that in a double conductor system as this is, very little, if any, of the current could be found diverted from the conductors to water or other pipes under ground in its vicinity.

The tests were begun on Lenox avenue near the Metropolitan company's 146th street power-station, and continued south. From the first, unmistakable signs were encountered of railway-current leakage from the rails of this road to both water and gas pipes, the sudden fluctuation of the voltmeter needle proving this beyond a doubt. It was noticed, however, that when a Lenox avenue car passed, there was no advance of the needle as should be expected, and when two cars passed, going in opposite directions, there was no advance of the needle at the moment; continuing down the street and testing at each fire hydrant and gas post the voltage tended to increase upon nearing 135th street. The readings during these tests were as follows, the rails being positive to the water and gas pipes:

Location.	Water.	Gas.	Remarks.
145th street.	½ volt.	½ volt.	
138th "	½ "	½ "	
136th "	½ "	½ "	
135th "	½ "	½ "	During this test no trolley car in sight on 135th street.
135th "	½ "		Test repeated when the 135th street overhead trolley car crossed Lenox avenue tracks.
125th "	½ "		
116th "	½ "		
109th " and Columbus ave.	½ "		

It was apparent from these tests that the most, if not all, of this leakage, came from the Union Railway Company's line, operating the overhead trolley system, a branch of this road running through 135th street, and thereby crossing the rails of the Metropolitan company's tracks at Lenox avenue. This seemed the more certain from the fact that the maximum reading (⅔ volts) was obtained when a Union railway car was crossing the rails at Lenox avenue, or was quite near. Further proof, however, was necessary to determine if that company was responsible for all or only a portion of this current escape; advantage was therefore taken of the period when the Union railway cars stopped running for the night at 1.30 A. M. to make some further tests.

(To be continued.)

PERSONAL.

Mr. M. T. Wilbur, who has been acting treasurer of the Western Union Telegraph Company since the death of Mr. Roswell H. Rochester, has been made treasurer of the company.

It is reported that Professor G. J. Brush, director of the Sheffield Scientific School, of Yale University, will retire next January, after serving as executive head of the school since 1872.

Mr. A. C. Garrison, of the Columbia Incandescent Lamp Company, St. Louis, and Miss Frances Billingsley will be married at the Central Presbyterian Church, St. Louis, on November 9. The Electrical Review extends cordial congratulations.

FOREIGN ELECTRICAL NEWS.

Telephonic Line Along the Shores of the Mediterranean—It is proposed to establish a telephone line between the towns on the shores of the Mediterranean and Marseilles. The practical utility of this circuit for economic interests will be appreciated by all the towns in question. Communication will not only be with Marseilles, but with all the stations with which Marseilles is connected, and particularly with Paris. In order to solve this important question, a conference was held in April last between the representatives of the various towns interested in the undertaking, and an inspector of telegraphs, M. Frouin, chief of the bureau of telegraphic correspondence to the ministry, who was specially appointed for the purpose by the Minister of Posts and Telegraphs. At the conference it was resolved to raise a loan of 350,000 francs, at 3.60 per cent, payable at the expiration of five years, this sum being guaranteed by the towns interested. With this assessment, the interests to be paid by these towns represents an annual sum of 12,600 francs. Of this amount Nice will contribute 2,000 francs; Marseilles, 2,000; Toulon, 3,000; Monaco, 3,000; Cannes, 500; Hyères, 300; Fréjus, 300; Mentone, 250; Draguignan, 250; Grasse, 200; Antibes, 200; Saint Raphaël, 200; Vallauris, 150; Beaulieu, 150, and Villefranche, 150.

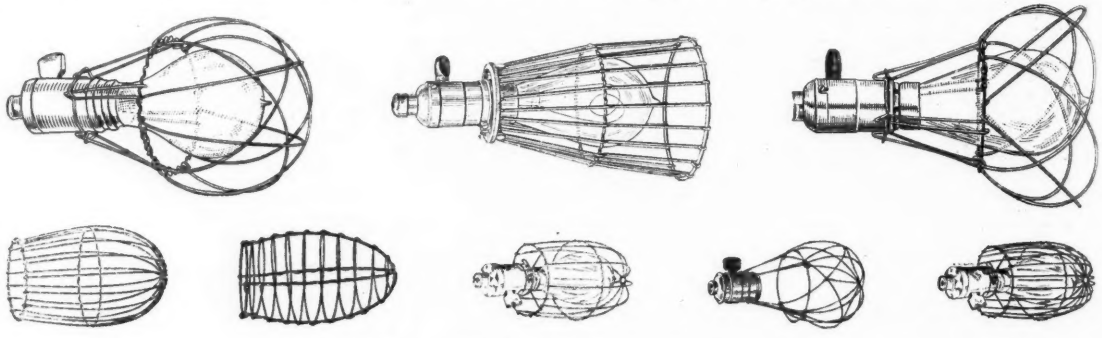
Danger in Alternating Currents—The necessity for remembering the dangers attached to alternating currents is always present with the electrician. Herr Weber, a professor of electricity at Zurich, has published a work in Germany on this all-important subject. The experiences of the author are divided into two groups; in the first, he seized hold of two conductors, one with the right, the other with the left hand, and caused a short circuit to pass through his arms and body. He at once experienced very disagreeable and even painful sensations, to which he could not have submitted had he not been sustained by the humane aim which he had in view. The currents to which Herr Weber submitted himself had a frequency of 50 interruptions per second, which was the number employed in the large factory in which his experiments were conducted. The apparatuses were placed in such a manner as to be increased in tension by steps of 10. The first tests took place with the hands wet, thus establishing a good conductivity. A difference of 30 volts was sufficient between the two wires to deaden the fingers, the hand, and even the arm. Notwithstanding this, however, Herr Weber was able to keep his hand on the wires for an appreciable length of time. If, however, the difference was increased to 50 volts, the muscles of the fingers, the hand, and even the arm were completely paralyzed. It was impossible for Herr Weber to disengage himself from the wires, and he would have perished on the spot had not the current been quickly turned off. At this degree of tension the tests could not continue for more than one or two seconds. The length of time during which experiments may continue depends on the thickness of the skin, the nature of the liquid with which the hands are moistened and the strength of the person performing the tests. Herr Weber used pure cold water in moistening his hands. He would undoubtedly have been able to reach a higher figure if warm and salted water had been used, or water in which a few drops of vinegar had been poured. In the same way a woman would have succumbed more rapidly, while a workman with callous hands would have been able to resist much longer, except the epidermis had been penetrated by means of some imperceptible fissure that the liquid would have discovered. * * * The second series of tests were carried out by Herr Weber with the hand on. He was now able to stand a much greater tension and was even able to reach 90 volts before becoming absolutely paralyzed. Following these tests, he made a series of experiments with continuous currents, when he claims the preceeding numbers were doubled, the same amperage, naturally moderate, being employed in each case—*L'Electricité.*

Action of Electricity on Plants—This subject was among the number of those brought up for discussion at the meeting of the British association last month, Professor Lenström and Dr. E. H. Cook conducting the discussion. Both these experts proceeded to give their experiences and described the researches they had carried out, showing that plants, when submitted to electric treatment, arrive at the age of maturity more rapidly than those that are left to the normal conditions of life. Professor Lenström had found that the electrical treatment applied to plants during clear, sunny days produced undesirable effects, unless a large quantity of water was used on them at the same time. As far as the nature of the influence exercised by electricity is concerned, he said that if the air transformed into ozone and nitrous acids impresses the plants, it increases their vegetation; in the same way, electricity excites the sap of plants and forces it to mount more rapidly into the capillary vessels. He thinks that the electric method can be practically employed in many cases, although there still remains much that needs careful study and research before an opinion can be definitely formed.

The Manufacture of White Lead by Means of Electricity—In a paper read before the Hygienic Council of the Department of the Seine, says *L'Electricien*, M. Ribau claims to be able to manufacture white lead by means of the electrolytic decomposition produced by currents. Tubs of sandstone are provided, in which is a mixture of carbonate of soda and chlorate of soda in solution. In this liquid thin sheets of lead are immersed, the sheets being placed in a vertical position parallel with each other and separated by a small interval of space. Sheets in pairs, for example, are united to the positive pole of an electric source, while single sheets are united to the positive pole. When the current is turned on, chlorate of lead is produced, and this chlorate of lead forms, on contact with the carbonate of soda, hydro carbonate of lead. Wooden rods, placed between the sheets of lead and made to oscillate by means of a common axle, are used to maintain by agitation the homogeneousness of the bath and to scrape, as fast as it is produced, the white lead adhering to the sheets of lead. The white lead falls to the bottom of the tubs, from which it is taken, and through a filtering press. The liquid that remains in the tubs is poured into a special kind of reservoir, when a current of carbonic acid regenerates the carbonate of soda at the expense of the soda which had been liberated by the current. This returns the mixture to its primitive condition of carbonate and chlorate of soda. It remains to be seen whether or not this process is applicable to industrial pursuits and if the white lead thus obtained possesses the qualities of that article as manufactured by the older methods. If the experiments above alluded to are satisfactory, the process of thus producing white lead should be encouraged, since by this process the risks of saturnine intoxication are reduced to a minimum.

Wire Guards for Incandescent Lamps.

The group of illustrations on this page shows a number of styles and sizes of wire guards for incandescent lamps, manufactured by P. R. Wagor & Company, 56 Harrison avenue, Springfield, Mass. This company also makes to order special guards for arc lamps, electric fans, and an extensive line of wire goods for other purposes.



WIRE GUARDS FOR INCANDESCENT LAMPS.

One type of guard made by this firm is provided with a wire clasp, by which it is attached to the lamp socket, thus saving the expense of a holder. Other types are fitted with wire holders, which are attached to a guard always ready for use. This holder has recently been improved and strengthened, which makes it a very desirable device. Similar guards are made of heavier wire, and a number of new types have been recently placed upon the market.

The guard known under the trade name of "No. 7" opens to allow the removal of the lamp without detaching the guard from the socket. There are no hooks, clasps nor springs to manipulate. By a slight pressure the wires move automatically, and stay open or closed as desired, being held in position by friction. They are fitted with the "Acme" guard-holder, which saves the expense of a special holder. Another type, known as "No. 8," is just now being introduced. It fits a two and one fourth-inch shade-holder, and is open at the end to allow the removal of the lamp without detaching it from the guard. In packing for shipment, these guards nest very closely, occupying an unusually small amount of space. P. R. Wagor & Company, the manufacturers, will send on request circulars illustrating and describing their product in detail.

ELECTRIC RAILWAY NOTES.

A franchise for an electric road from Santiago de Cuba to the cemetery and to El Caney has been granted by General Wood to prominent local business representatives.

At the annual meeting of the Middletown, Ct., Street Railway Company Israel A. Kelsey, of New Haven, was elected president; A. C. Allison, vice-president; James K. Guy, secretary and treasurer, and E. W. Goss, superintendent.

The annual report of the Worcester & Marlboro, Mass., Street Railway Company shows gross earnings of $88,784; expenses, $57,005; net, $31,778; charges, $10,000; dividends at rate of six per cent, $12,000, leaving a surplus of $9,787.

At the annual meeting of the Shelburne Falls, Mass., & Colrain Street Railway Company the following directors were elected: Lorenzo Griswold and C. A. Marcy, of Colrain; Herbert Newell, Edwin Baker, F. L. Davenport, J. C. Wood and Dr. F. J. Canedy, of Shelburne Falls. The directors elected C. A. Marcy, president; Dr. F. J. Canedy, vice-president; Edwin Baker, clerk; Fred E. Merrick, treasurer.

Alexander Brown & Sons, of Baltimore, are at the head of a syndicate which has purchased $800,000 of bonds and $400,000 of preferred stock of the Newport News and Old Point Railway and Electric Company, of Newport News, Va., the proceeds of which are to be used in extending the line of the road and improvements generally. The bonds are five per cent, 40-year gold, and the stock is five per cent cumulative.

At the annual meeting of the stockholders of the West Roxbury, Mass., & Roslindale Street Railway Company it was agreed to increase the capital stock $100,000, for the purpose of funding the floating indebtedness and extending the company's tracks. The following-named officers were elected: President, T. T. Robinson; treasurer and clerk, F. N. Terrell; directors, Robert Bleakie, J. S. Bleakie, Clifford Deveur, Robert B. Fairbanks and N. P. Whittemore.

James Duane Livingstone, of New York, has been chosen president of the Northeast Electric Street Railway, of Kansas City, to succeed W. M. Reid. This is the first step toward a complete transformation of this line. It is reported that the next move will be the consolidation of the Northeast with the new Central Electric Company, which is about to go before the City Council for a franchise. Mr. Reid still retains his interest in the road and will remain in the board of directors. S. M. Jarvis, of New York, was chosen vice-president, and E. G. Vaughan, of Kansas City, secretary and treasurer.

The Southwest Missouri Electric Railway, one of the longest continuous electric lines in the world, has been reorganized, and the controlling interest has passed into the hands of Joplin, Mo., and Harrisburg, Pa., capitalists. A. H. Rogers, of Joplin, the promoter of the road, has been elected president and treasurer; E. Z. Wallover, of Harrisburg, vice-president; A. G. Knisely, of Harrisburg, secretary; George J. Paul, of Aurora, Ill., superintendent. The Southwest Missouri line extends from Galena, Kas., through Central City, Joplin, Webb City, Carterville and Prosperity, Mo., to Carthage, Mo., a distance of 27 miles, passing through the heart of the great lead and zinc mining belt.

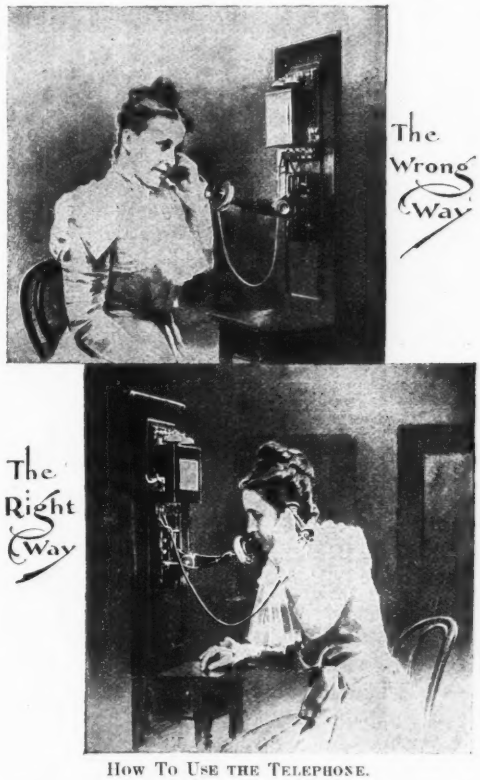
The Electric Potential Club.

The monthly dinner of the Electric Potential, of Boston, was held at the Hotel Thorndike in that city on the evening of October 26. There were about 50 members present, and Col. E. H. Hewins made a brief address on the important part played by electricity in the late war with Spain. Mr. George D. Burton delivered an address on a new process of unhairing and tanning green kangaroo skins by the use of electricity.

How To Use the Telephone.

The Southern Bell Telephone and Telegraph Company, through traffic manager H. W. Pope, has issued an exceptionally artistic and interesting booklet, giving information of value to the public concerning many little advantages of the telephone which are not generally known. The illustration published herewith is taken from the booklet and shows the right way and the wrong way to use the telephone.

"The quickest, cheapest and most convenient way to get over the ground is to sit still and use the telephone" is one of the aphorisms set down which requires no proof. A party line system, the private branch exchange, and the toll line service of the Southern Bell company are cleverly illustrated and described.



How To Use the Telephone.

ELECTRIC LIGHT FLASHES.

The Richmond, Va., Paper Manufacturing Company has awarded a contract for installing an electric light plant at their mills, in Richmond, Va., to the Electric Construction Company, of Virginia.

At the annual meeting of the Centreville, N. Y., Water and Electric Company, the old officers were nearly all re-elected; viz., H. J. Hampson, president; E. L. Clapp, secretary, and L. H. Hascall, treasurer.

The Binghamton, N. Y., Electrical Construction Company, of which ex-postmaster Charles F. Terhune is the president, has secured the contract for the electric wiring of the dormitory to be erected at the Woman's Relief Corps home in Oxford.

Johannesburg, South Africa, is to enlarge its lighting plant, the additions including both water-gas apparatus and electric generators. Proposals from America as well as Europe will be considered. A battery of seven water-tube boilers, made in this country, has been ordered for the De Beers mines in Kimberley.

The Tonawanda Cataract Power Company has been incorporated to furnish electricity or other power; office, North Tonawanda, N. Y.; capital, $100,000; directors, Ed D. Adams, Francis Lynde Stetson, E. A. Wickes, W. B. Rankine, New York; Chas. A. Sweet, Lincoln A. Groat, Buffalo; Delancy Rankine, Niagara Falls.

At the annual meeting of the Edison Illuminating Company the following directors were elected: J. V. Bull, N. P. Cornell, F. H. Knight, William Laubach, Levi Rosenbaum, John Rinek and William Young. The board organized by electing these officers: N. P. Cornell, president; Fletcher H. Knight, vice-president, and Howard Rinek, secretary, treasurer and general manager.

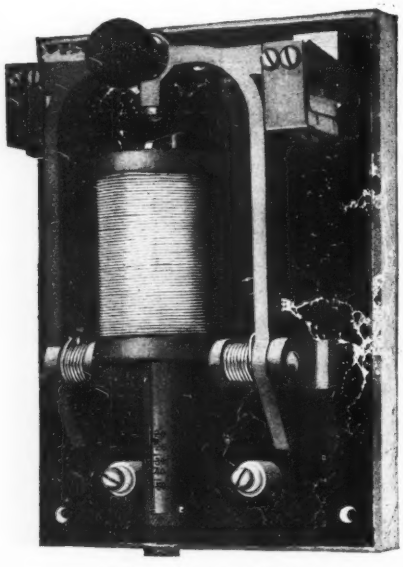
The electrical committee of the Philadelphia City Councils met last week and passed upon the annual expenses of the Electrical Bureau for next year. These show a decrease in the current expenses, but provide for $75,000 additional for new electric lights. Last year the appropriation for running expenses was $1,026,086, while this year, exclusive of the above special item, only $1,025,494.60 is asked.

Newton Appliance Company.

Owing to the rapid increase of business and the necessity of enlarging their plant for filling the many orders now being received, the Newton Appliance Company, of 120 Liberty street, New York city, has been incorporated into a stock company with a capital of $25,000. Mr. Arthur J. Newton will still remain in the capacity of president of the new company, and the following well known gentlemen will act as directors: Chas. W. Eidlitz, Louis Heck, James A. Stiles, David E. Drake, Benj. F. Hamilton and W. J. Newton.

A New Circuit-Breaker.

In the illustration herewith is shown a new type of single-pole circuit breaker, manufactured by the well known firm of F. A. La Roche & Company, Thirteenth and Hudson streets, New York city. This circuit-breaker is also made with over and under-load attachments for motor work. It is especially adapted for



A NEW CIRCUIT-BREAKER.

high voltages ranging in the neighborhood of 2,000 volts, and is guaranteed to break 2,000 volts successfully without arcing at the clips.

This feature is accomplished by the method in which the carbons are attached to the breaker. It will be noticed that the carbons are parallel to the clips, and as the breaker opens, the carbon attached to the blades opens with a cam motion, which keeps a rubbing contact on the stationary carbon until the blades themselves are well out of the clips and at a safe distance, then the circuit is finally broken through the carbons and below the clips, so that no burning of the clips or blades can possibly take place.

The blades are of the wedge type and close into "V"-shaped clips. These are laminated and flexible to an extent, so that they adapt themselves to the shape of the blades, and an absolutely tight contact is thereby formed.

The latch and trigger are made of case-hardened steel, and are of the compound lever type, so constructed as to permit of a very weak solenoid being used, as the force of the blow required to operate the breaker will be very small. This method of construction is claimed to be new in this style of instrument.

The hinge posts and blade arms do not carry any current, and there are two phosphor bronze springs in each hinge. These springs are quite weak and only sufficiently strong to give the switch a sharp and quick break. Owing to the peculiarly shaped blades and clips, it is clamed to be an absolute impossibility for the circuit-breaker to stick, and the construction of the clips tends to throw the blades out of their own account. This breaker would really operate without these springs in the hinge, the springs being there only to assist in quickening the motion.

On the bottom of the lever arms are two projections which are parts of the blade frame and come in contact with a buffer, so that when the breaker is opened and performing its function, the blow on the hinge post is reduced to a minimum.

Underneath the solenoid is a copper tube upon which is marked the calibration in amperes and fractions thereof. Upon the end of this tube is a milled head screw and nut which admits of adjusting the circuit-breaker to open at any desired point within its guaranteed high and low-ampere ratings. These circuit-breakers are handsomely finished in copper throughout, no brass or iron being used. It is an unusually neat and substantial circuit-breaker for motor work.

These breakers are mounted on either white marble or marbleized slate bases, as may be desired, and require no re-mounting, as each breaker is provided with binding posts. It will operate in a box or panel board requiring only five inches depth, and it is simply necessary to run a wire to the binding post without any other connections or mounting. Special care is taken to calibrate these instruments, and they are said to be as reliable as any standard ampere meter, and are made in sizes from 15 amperes up to 500 amperes.

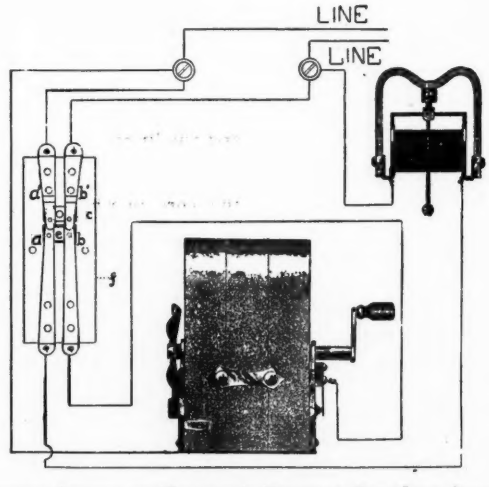
LITERARY.

"Pending Problems" form the theme of a paper of national importance furnished by the Hon. Hannis Taylor, late United States Minister to Spain, to the *North American Review* for November. "No successful attempt can be made," maintains Mr. Taylor, "to master the grave and far-reaching questions of national and international policy that have been suddenly put before us through the results of the recent war, without a clear comprehension of the fact that that war was the inevitable outcome of our national development, which has drawn after it, as a necessary consequence, a vast and rapid territorial expansion."

New Non-Infringing Multiple Toll-Line System.

The accompanying illustration shows a new and unique way of connecting telephones on a toll or party line in multiple. It is claimed that it is most efficient and absolutely non-infringing. The Williams Electric Company, of Cleveland, Ohio, has applied for letters patent on this system, and report very large sales of the same.

The principle of the system, as will be seen from the illustration, is to connect the generator and ringer of every instrument in series with each other, but the different instruments will be bridged across the line in multiple. This is accomplished by means of a double-acting, double-circuit push-button, where F is a fiber or hard-rubber block which has riveted to it contact springs A and B, A prime and B prime which connect to the terminals of the ringer and generator and to the two line wires respectively. There is also a contact plate C upon which contact springs A and B normally press, thus short-circuiting them or connecting together the free terminals of the generator and ringer. The other terminals of the generator and ringer are connected to the opposite line wires respectively. To operate this



RINGING CIRCUIT OF WILLIAMS'S MULTIPLE TOLL-LINE SYSTEM.

bell in sending a call press the button (not shown in illustration) which removes contact springs A and B from contact plate C and connects them respectively to contacts springs A prime and B prime, thus communicating directly with the opposite line wires. This operation throws the ringer and generator, while in the act of sending a call, into direct multiple connection with the line wires, so that the current impulses from the generator are not weakened or retarded through having to ring through resistance coils, but on the contrary are delivered to the line in their full strength. The ringers are high wound and the generators are low wound, and the added self-induction and resistance of the generator coil, the latter being in series with the ringer coil, have the effect of making the self inductance and resistance of each station or instrument that is bridged across the line considerably more, it is claimed, than would be the case were they bridged directly to line under all conditions, as in the Carty system. This being the case, the ringing current will have a tendency to divide more equally along the line, thus giving better service than by the old method. The advantage of this system is especially noticeable on long lines of iron wire, where the resistance, leakage and static capacity all combine to the detriment of good service. The ringers are wound to a resistance of 1,000, 1,600 or 2,500 ohms as may be specified. The new Williams single-core ringer employed in this system gives to it a very high efficiency, in as much as its construction gives to it an enormous co-efficient of self-induction.

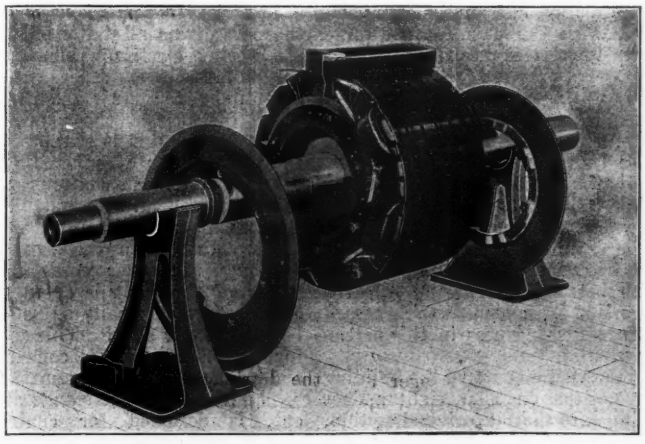
American Electrical Supremacy.

[*From London Lightning.*]

According to statistics recently published, the capital invested in United States electrical enterprises did not much exceed $1,000,000 in 1888. The sum now at stake in the same business is $1,000,000,000, or £200,000,000 sterling. A record, we should imagine, in progress and enterprise, and a full explanation of the commanding postion now held by American electrical machinery in the markets of the world, our own not excluded.

High and Low-Frequency Single-Phase Alternators.

For alternating-current electric plants, in which lights alone are to be considered, with a high-potential distribution, high-periodicity generating apparatus is desirable both from simplicity and low first cost. When, however, long-distance transmission



ARMATURE OF HIGH-PERIODICITY ALTERNATOR.

enters as an important factor, a periodicity of 60 cycles, on account of diminished reactive drop in the lines, allows of transmission over a greater distance than by a high periodicity.

The General Electric Company manufactures alternators of 60 and 125-cycles frequency in both revolving-armature and revolving-field types. Revolving-armature machines of 125 cycles frequency are built in five standard sizes, 30, 60, 90, 120 and 180 kilowatts, each size wound for 1,040 or 2,080 volts. The low-periodicity alternators are wound for 1,040, 2,080 or 3,120 volts, and are built in capacities of 60, 90, 120 and 180 kilowatts. All are arranged for belt driving and are set on rails.

The fields are both separately and self-excited, part of the main current being rectified for the self-excitation. The current for the separate excitation of the fields is derived from a small direct current generator driven by belt from a pulley on the end of the armature shaft. The two windings allow of adjustment of the fields to automatically compensate for changes of load, thus giving a practically constant potential at the terminals. The machine may also be over-compounded to compensate for line loss.

The degree of compounding is regulated by a shunt mounted against the inside of the pillow block at the collector end. It is properly adjusted when the machine is under test at the factory.

The magnetic field includes part of the frame, which is a cast-iron ring with inwardly projecting poles of laminated iron. By this means eddy current losses are reduced and the reluctance of the magnetic circuit diminished. Both separate and series field coils are wound upon removable spools, the winding of double covered copper wire being carefully insulated from the spools themselves.

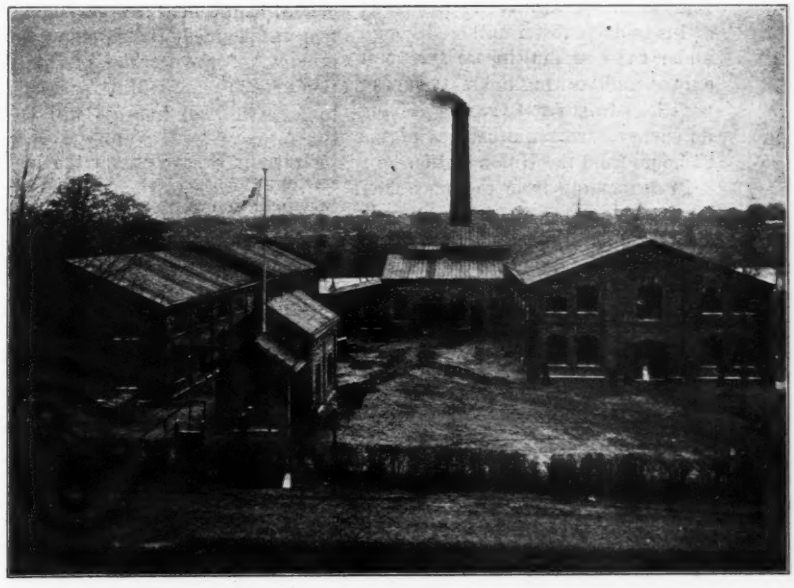
The armature is iron-clad; laminations of soft steel built up on a cast-iron spider from the core, and each shunt is carefully japanned before assembly, while to guard against eddy currents thin paper sheets are interposed between adjoining plates at frequent intervals. The core is thoroughly ventilated by air drawn through the spider and circulating in the ventilating spaces between core and windings. The coils are wound on forms and thoroughly taped and insulated before they are placed in the core, in which they are secured by insulating blocks. They are supported at the end by saddles of light metal, which give ample support to avoid injury by centrifugal force. This method allows of ready removal of any coil when necessary.

Commutators and collectors are of copper of the highest conductivity, and are mounted on a metal hub keyed to the shaft. The insulation consists of mica and hard rubber, so arranged that short circuits and grounds are practically impossible. The collector brush-holders are supported on a cast-iron standard, and insulated from it by hard rubber bushings. The commutator brush holders are supported on a yoke carried by the adjoining pillow block. The bearings are spherical and self-oiling, self-centering and self-aligning, and of ample length to insure cool running.

Each alternator before shipment is subjected to most thorough test. The insulation of the separately excited field coils is tested to 3,000 volts alternating, and the series coils and armatures at pressures at least double the normal operating voltage.

An Important European Factory Established by an American Company.

The expansion that is now receiving the attention of the citizens of the United States is exemplified in the recent erection of a large European factory at Hamburg by an American company. The development in the field so efficiently occupied by the Standard Paint Company in this country has caused a demand for its product to spread to all parts of the world, and it became evident to the leading spirits in this wideawake company that a European factory at Hamburg would be a good investment. A little over a year ago the construction of the factory was begun at Hamburg, Germany, and was completed the first part of this year. The same well known products that are being manufactured by the Standard Paint Company at their American works are now regularly manufactured at Hamburg and are being supplied to all parts of Europe from that point. The president of the company, Mr. Ralph Shainwald, has devoted a great deal of time and attention to the establishment of the European works. He states that there is very great activity in all electrical interests in Europe, and that there is a very large demand for all grades of the products of his company abroad. There are especially large demands for the P. & B. electrical compounds and the P. & B. tape and armature varnish. These are in use by nearly all the leading manufacturers and traction companies in all the European countries. There is a very great amount of work going on in street traction, especially in the cities of Great Britain and Germany. Italy is also coming to the front rapidly in these interests. The Hamburg works are manufacturing the same goods as the main factory in this country, not only those which pertain directly to the electrical trades, but also the P. & B. ruberoid roofing, P. & B. building, sheathing and insulating papers and P. & B. preservative roof and structural paints. An illustration of this factory is shown on this page. The ELECTRICAL REVIEW congratulates Mr. Shainwald and his associates on their enterprise and success.



STANDARD PAINT COMPANY'S FACTORY AT HAMBURG, GERMANY.

LITERARY.

Captain F. E. Chadwick, commanding the flagship "New York," and chief of staff to Admiral Sampson, writes of "The Navy in the War," in *Scribner's* for November, and presents for the first time a deliberate professional account of the way the situation was met and the lessons learned regarding modern types and classes of vessels. Many questions that waited to be solved were answered in the destruction of Admiral Cervera's fleet, and these, with suggestions that bear pertinently on our future naval policy, are fully dealt with by Captain Chadwick. His theories concerning the elements of Spanish character that led to their defeat, and clear statement of the strategical purposes of Admiral Cervera in his attempted flight from Santiago Harbor, are both new and especially interesting.

NEW YORK ELECTRICAL SOCIETY

ENTERTAINED BY THE EDISON ELECTRIC ILLUMINATING COMPANY OF BROOKLYN.

The New York Electrical Society met last Thursday, October 27, at 7.30 P. M., at the Pearl street station of the Edison Electric Illuminating Company of Brooklyn. Dr. Gano S. Dunn, the president, and Geo H. Guy, the secretary, and about 200 members were present. Mr. W. S. Barstow, the general superintendent and chief engineer of the Edison company, welcomed the visitors, and they were afterwards shown through the central stations of the company under the guidance of president Ethan Allen Doty, Mr. Barstow and Mr. John F. Outwater.

Special parlor cars were provided for the trips to the different stations, and a very enjoyable collation was served on the trip homeward bound. We present the following description of the three stations visited, which will interest all electric light men.

The Pearl street station, first visited, although reconstructed and enlarged, was the first station of the Brooklyn Edison Company, erected in 1889. The original station was contemplated for an ultimate capacity of 3,000 horse-power, and, enlarged and rebuilt, it now has in operation 5,000 horse-power, with an ultimate capacity of 15,000 horse-power. It was originally, and is to-day, a steam station although under the new multiphase system it only operates during the maximum or peak load from 5 to 12 P. M., receiving its energy during the balance of the 24 hours from the Union station.

In descending from the office floor into the engine-room, entrance is made directly upon the electrical gallery. This gallery contains the low-tension switchboard, used for distributing to the Edison system. It also contains the regulating apparatus for the rotary transformers which carry the load during the time that the steam plant is shut down. The station is operating by steam during the peak period, and the rotary transformers are delivering to the multiphase or taking from the multiphase system whatever energy is required to keep the steam plant at full maximum load. This conversion of the rotary into a generator or motor type, whereby the multiphase energy is delivered to the line or received from the line, is accomplished by the gallery operator by the controlling of a small two-ampere multiphase switch, which also regulates the voltage and shifts the load on rotary transformers.

In descending from the gallery to the engine-room floor, the members found themselves among the large, vertical, compound-condensing, direct-connected, low-tension units, which illustrate the latest improved type of central-station direct-current machinery. In the rear of the engines were static transformers, which receive the 6,000-volt, three-phase energy from the Union station, the induction regulators which regulate the voltage of the secondary alternating current delivered from the static transformers, and the rotary transformers which receive this regulated current and convert it into direct current ready for delivery to the bus-bars of the station. The entire station is operated with a very small amount of help, the rotaries requiring no attention whatever. Directly in the rear of the room is the large, self-cooling condenser plant which circulates water through the tower on the roof of the building, and condenses the steam delivered by the compound engines. Upon leaving the engine-room, one enters at once the original property of the Edison company. This room was formerly a model engine-room of a model station in times when cross-compound, high-speed engines were vertically belted to bipolar high-speed generators located in a large dynamo-room above. This engine-room was on the point of being converted into a boiler-room, when the multiphase system was planned, and so stopped the progress of the work. As this station's steam plant will never be added to hereafter, all increase will be in the form of transforming apparatus for current received from the Union station.

Sub-station A is one of the most interesting of all the sub-stations. The original building, on the corner of De Kalb avenue and Rockwell place, was operated for many years by the Citizens' Electric Illuminating Company, and was, perhaps, the best example in its time of a high-tension series arc plant. The original building, of wooden floors and brick walls, contained three large Wright–Corliss slow-speed engines. These and numerous pieces of counter-shafting and belts were connected to Thomson–Houston 45-light arc machines on the floor above. This plant, erected during the eighties, became so overloaded that the entire building, from the continual jarring, was weakened, and plans were at once made by the Citizens' company for the erection on adjacent property of an improved fireproof, high-tension arc-light station. This new building was completed about five years ago, and contained high-speed, triple-expansion, vertical engines, belted to counter-shafting on the floor above, and driving Thomson–Houston 45-light machines. This was the condition of the property when the company was purchased by the Edison Electric Illuminating Company of Brooklyn. The work of transferring the entire business into the new fireproof building from the old was continued by the installation of a 1,200-horse-power Corliss engine, and the replacing of fifty-two 45-light Thomson–Houston machines by twenty-four 120-light Brush machines. This transformation had almost been completed when the plan for the large multiphase system was adopted.

This plan provided for the shutting down of the old original and new station, the converting of the dynamo-room in the new fireproof building into a large storeroom, and the placing in the engine-room of this new building all the transforming apparatus necessary to supply the business of the entire company. The boiler-room was reserved for a battery-room, which battery, discharging into the network of Edison mains, takes care of the increased business in this particular district.

As the visitors entered the building they noticed on their right a door leading into the old original station, which shows "what has been." On their left they looked down upon the transforming apparatus necessary to convert the multiphase energy from the Union station into current adapted for high-tension series arc work, and then appreciated the enormous saving in space which had been attained. The original floor space necessary to supply the 1,800 series arc lamps connected amounted to 32,000 square feet, while the floor space used for the same capacity in transforming apparatus amounts to 4,000 square feet, and yet another improvement, it was announced, is destined to shortly reduce this to 500 square feet.

One switchboard is used in connection with the storage battery for low-tension distribution. The switchboard in the center is the receiving and distributing board for the high-tension multiphase current. The board on the extreme right is used for the distribution of series arc-lamp circuits. On the left of the low-tension board is placed a booster set for charging storage batteries. In the front of the building was the high-tension distributing center switchboard. All energy transmitted from the Union station to the city sub-stations passes through this board, and is distributed from this point to the various city sub-stations. Each feeder is in duplicate, and switches and fuses of the simplest pattern are used for their control. Returning again to the transforming-room, a door to the right leads into a passage in which are arranged the large regulating switches for storage batteries. Back of these regulating switches, and entered by a door on the left, is the battery-room. In this is located a 14,000-ampere-hour battery, which is used in conjunction with the distributing system as above mentioned.

Ground was broken for the Union station at Bay Ridge about March 1, 1897, and the station was in operation December 1 of the same year, although not entirely completed. The present building is one-quarter the size of the projected station, in which it is planned to accommodate 90,000 horse-power. In designing this station special attention was paid to the use of steam, and 100 feet will cover the length of all steam piping for the present operating capacity of 4,500 horse-power. The boilers and engines are placed as closely together as possible, and steam is used only in the main engine, all station auxiliaries, etc., being electric. This reduces station losses by eight per cent, and is accountable to a great extent for the high efficiency of the plant. One noticeable feature is that, owing to the combination of sub-stations and different systems in conjunction with this large generating plant, the load upon this generating plant is fairly constant throughout the entire day of 24 hours. In other words the load factor of the plant is about 85 per cent, and when finally adjusted will be over 90 per cent. This accounts for high efficiency in coal consumption and labor per unit of current.

The building, as it stands at present, is designed for engines of either horizontal or vertical type, and for any type of boiler. Extending beneath the heavy concrete foundations, and below the tide level, are two large masonry tunnels, which convey the condensing water to a point directly beneath each surface condenser, where it is picked up from one tunnel by a simple electric centrifugal pump, passed through the condenser and discharged into the second tunnel, thereby producing a siphon effect, and requiring a small amount of power for its circulation.

The fields of the large generators are charged by a synchronous motor direct-current dynamo combination, in conjunction with which is to be used a small storage battery, now in process of installation in the building directly without the main station.

The automatic method of handling the coal throughout the station and in the unloading tower can be seen. On account of the heavy steady load, the details of the station are not yet completed, but are rapidly nearing this stage.

The large switchboard at one end of the engine-room upon the gallery handles directly the 6,000-volt three-phase current by means of hand and pneumatic switches. A large number of the fuses are contained in special fuse-cabinets over the gallery.

Throughout the station visitors were warned to touch nothing, as 6,000-volt current only is generated at this plant.

Among those present, in addition to the officers of the company and the association, were Messrs. Charles S. Bradley, E. L. Reckenzaun, Chas. W. Price, E. F. Peck, Joseph Wetzler, Robt. H. Read, W. J. Hammer, C. W. Rice and Dr. Newman. A number of new members were elected at the meeting of the society, and a vote of thanks to the Edison company for its very liberal courtesies was unanimously voted.

Street Railways in Gothenburg.

United States Consul Robert S. S. Bergh writes from Gothenburg, Sweden, under date of September 26, as follows:

In March, 1897, the City Council appointed a committee to collect information, etc., in the matter of the projected electric tramways in Gothenburg. The committee has now made a report recommending that the city should build an electric-power station and four electric tramway lines, overhead construction, the lines to be used by the present tramway company, on payment to the city of certain dues and a certain percentage of the profit; the company to provide the rolling material. The street railways will thus be used by the company for 20 years after they are finished, when the city will purchase the rolling stock and undertake the management of the tramways.

The Gothenburg Tramways Company, which now uses horse-power, has been granted a concession up to 1917; hence the above proposition is intended to be a compromise between the city and the company. Two other persons have asked for concessions to build electric tramways here; but the city has refused on the supposition that it can make a satisfactory contract with the Gothenburg Tramways Company.

For several reasons, the committee has come to the conclusion that electricity is the best motive power for tramways, and that the overhead transmission system is the best.

Siemens & Halske, of Berlin, have furnished the committee an estimate, from which it appears that the total cost of construction (value of sites for the buildings not counted and value of the old tramways deducted) will amount to about 1,870,000 kronor ($501,160), of which the city's share would be 1,278,000 kronor ($342,504). This last sum includes the cost of the power plant—360,000 kronor ($96,480)—with cost of wire and tracks.

It is estimated that the yearly running expenses will be 296,000 kronor ($79,328), whereof the city's share will be 89,000 kronor ($23,852). The yearly expenses to be paid by the city on account of the electric tramways will be: Sinking fund, interest and installments on the loan, 64,000 kronor ($17,152); running expenses, as above stated, 89,000 kronor; or altogether 153,000 ($41,004).

According to the proposed contract, the company will pay yearly to the city eight per cent of the cost of construction of the roads (the power plant excluded), or 72,000 kronor ($19,296); and certain dues per kilowatt, amounting per year to 86,010 kronor ($23,051); or altogether 158,010 kronor ($42,347). If the gross receipts of the company any one year exceed 400,000 kronor ($107,200), the company must pay the city 12 per cent of the excess. The city has reserved rights to arrange cheap trips for working people before eight o'clock in the morning, and has stipulated that passengers who have paid regular fare on one tramway line may continue on another by paying half fare in addition to the sum first paid. The work shall begin in May, 1899, and two of the lines shall be finished before November, 1899, and the rest ready for traffic by September, 1900.

The cost of construction of the railways, with a length of 12,205 meters (13,347 yards), of which 11,925 meters (13,041 yards) is in double tracks, is calculated as follows:

Description.	To be paid by the city.		To be paid by the tramway company.	
	Marks.		Marks.	
Buildings:				
Boiler and engine-houses, with foundations and chimney	74,500	$17,731		
Car depot and repair shop			98,000	$23,324
Residence for managers, etc.			24,100	5,735
Well and pipes for water supply and storehouse for coal	14,800	3,522		
Boilers and machinery (3 tubular boilers of 204 square meters—2,195 square feet—heating surface and overpressure of 10 atmospheres each; 3 standing condensing boilers, each normally of 230 horse-power, and at a speed of 125 turns 300 horse-power; 3 direct-coupled dynamos, each of 200 kilowatts and 550 volts; instrument dial and connections)	302,500	71,994		
Cables, wires, etc. (double-working circuit, poles and wall fastenings, wire connection between the rails for return current, feeding wires, etc.)	292,400	69,592		
Rolling stock (25 motor cars, whereof 4 in reserve, with 16 seats and room for 14 standing passengers, and with 2 motors of 20 horse-power; 21 trail cars, whereof 10 closed and 11 open, each with room for 30 to 32 passengers)			519,400	123,617
Tracks (24,130 meters of tracks, with rails weighing 92.51 kilograms—201.74 pounds—per meter, and stone pavement in the neighborhood of the rails)	680,000	161,840		
Special arrangements:				
Movable crane and working machinery in the repair shop	5,000	1,190	12,680	3,037
Turn-table			2,000	476
Sundry fixtures	1,000	238	7,800	1,856
Motors and transmissions in the workshop, uniforms, etc.			27,720	6,597
Supervision, etc.	50,000	11,900	30,000	7,140
Total	1,420,200	338,007	721,700	171,764
Less value of the old tramways			64,200	14,280
Total	1,420,200	338,007	657,500	157,484

The total is 2,077,707 marks ($494,494), value of the sites for the buildings not counted.

The Bullock Electric Manufacturing Company.

The above company are preparing now to move out to their new shops in Norwood, Ohio. The machine shops have been finished for some time, and the company could have moved in by this time if they themselves had been in a position to move. The company have been so rushed with orders that they could not spare the time to build the electrical apparatus they will need for their own use in Norwood. They are building two large generators, which are to be direct-connected to a cross-compound engine, built by the Lane & Bodley Company, of Cincinnati. These generators are to furnish power for the machine shop, which is to be driven entirely by electrical power. As soon as these generators are completed the company will move—probably in about two weeks. The process of moving will be done in as short space of time as is possible, as the company has so many orders that they can not afford to lose time. The company has booked a good many orders in the last month, and are in a very busy condition.

It is rather interesting to note the orders for the various different types and sizes of machines for direct current the Bullock company have received during the last month. This company have lately gotten out a new type of enclosed motor, for use in factories and machine shops, for direct connection to cranes, machine tools, etc. This is still being changed somewhat, and will not be ready to illustrate for a couple of weeks. The Pacific Coast Borax Company ordered 10 of these motors, amounting to 160 horse-power, to be used to gear to various tools. The Midland Steel Company ordered these motors for their traveling cranes, and the Bullock company lately received two more orders for these motors directly in headstock of lathes.

The New York *Sun* has just ordered from the Bullock company another 30 horse-power press equipment, to be a duplicate of the equipments the company furnished them before. This equipment is for the Bullock teaser system. The Toronto *Globe* also has ordered from the Bullock company a like equipment of 40 horse-power for a large Hoe press. Unwin Brothers, of London, have ordered another press motor like their last. The Bullock company also have entered orders for a couple of generators for direct connection to gas engine, and a 100-horse-power motor and 150 kilowatt generator, slow speed, three bearings, for J. B. King, Roslyn, L. I.

Besides the above, the Bullock company have received many orders for their standard apparatus. The above is a sample of the various types of machines for direct current, which one company is building.

Advertising Aphorisms.

The following paragraphs are quoted from a dainty and masterly little volume, entitled "Short Talks on Advertising" by Charles Austin Bates, the well known advertising expert, Vanderbilt Building, New York city. The book is for sale at a nominal price, and is one that should be in the possession of every advertiser. The quotations follow:

It has been truly said that the time to advertise is all the time.

Advertise in busy times, because the iron must be struck while it is hot, and advertise in dull times to heat the iron.

It is the systematic, persistent effort that pays in advertising as in everything else. In taking medicine the regularity of the dose is almost as important as the drug itself.

The honester you can be in your ads. the better people will like it. Not only be honest, but let the ads. show and prove that you are. People like to know the how and who of everything nowadays.

It is continuous effort that pays in advertising as in everything else. A business man doesn't keep his store open one day in the week, or one week in the month, or three months in the year. If he advertises in such a way, that is the impression people will get.

There is a thought which never occurred to me, but which was conveyed in a remark recently made to me by Mr. M. M. Gillam, the advertising manager at Wanamaker's. He said: "A sleepy paper gathers a sleepy constituency. An alert, wide-awake, progressive sheet gets readers who like that sort of thing—or lifts them to its level."

Advertising what you haven't got or what you don't do is worse than not advertising at all. You can't well be too careful about this. Make your ads. strictly true in letter and in spirit. I believe that the majority of business men do this now, but as it is the most important thing about advertising, it will bear repeating and reiterating.

ADVANCE INFORMATION

Electric Light and Power.

MOUNTAIN LAKE PARK, MD.—The Mountain Lake Park Association contemplates the construction of an electric lighting plant.

YAZOO CITY, MISS.—L. G. Montgomery may give information concerning contemplated construction of electric light plant.

ST. LOUIS, MO.—The Northwestern Electric Heat and Power Company has been incorporated by F. W. Blees, John F. Schafer and Charles E. Roehl; capital stock, $30,000.

ASHEBORO, N. C.—John T. Moffitt may give information concerning establishment of an electric lighting plant.

GREENSBORO, N. C.—B. S. Johnson and others, of Baltimore, Md., contemplate installing an incandescent electric lighting plant in Greensboro.

SALISBURY, N. C.—F. E. Boardman has been granted franchise for constructing an electric light plant.

WINCHESTER, VA. — The Winchester Gas and Electric Light Company is considering the establishment of an arc plant.

HARPERS, W. VA.—The Harper's Ferry Light and Power Company has obtained franchise for establishment of an electric lighting plant.

BONHAM, TEX. — The Bonham Electric Light and Power Company has been incorporated by J. F. Heledge, J. B. Russell, J. N. Rainey and E. F. White; capital stock, $25,000.

KEY WEST, FLA.—J. L. Watrous has asked for franchise to construct and operate street railway power plant, electric lighting plant, telephone system, etc.

COUNCIL BLUFFS, IOWA — The Council Bluffs Gas and Electric Company has been incorporated, with a capital stock of $250,000.

CHICAGO, ILL.—Electric Heat and Power Company has been incorporated by Chas. B. Coffeen, Alvah S. Hopkins and Howard B. Cook; capital stock, $5,000.

BALDWIN, WIS.—A company has been organized here known as the Baldwin Electric Light Company, and has commenced putting in a plant here. It will be ready for operation in about a month.

DENVER, COLO. — The Hinsdale Electric Light and Power Company has been organized for the purpose of lighting Lake City with electricity. It will also put in telephone lines for local use in Hinsdale County.

New Telephone and Telegraph Companies.

LYONS, N. Y.—Messrs. Sherman E. and Alvin B. Bishop, of Clyde, have been granted a franchise to build a telephone exchange in this place. A stock company is now being formed, and the work of building the lines will soon begin. It is proposed to construct trunk lines, connecting the Lyons exchanges with the exchanges in Clyde and Newark.

KENTON, OHIO—The citizens of this place have started a telephone company of their own and will compete with the Central Union. They have incorporated with a capital stock of $30,000, and contemplate running a line to this city.

BURLINGTON, N. J.—The Rivershore Telephone Company has been incorporated by Nathan Haines, J. Howard Pugh, George C. Gunn, Mitchell B. Perkins and Henry V. Massey; telegraph and telephone business; capital stock, $25,000.

WORCESTER, MASS.—The People's Telephone and Telegraph Company has been incorporated with Israel L. Currier, president; Fred W. White, treasurer; capital stock, $150,000.

PRAIRIE, IND.—The Prairie Telephone Company has been incorporated with a capital stock of $10,000.

LEXINGTON, N. C.—The Lexington Telephone Company has let contract for the extension of its line from Lexington to Salisbury.

ROSEBERRY, ORE.—Telephone connection between Roseburg and Portland has been established. Work on the new line to San Francisco is being pushed.

MANCHESTER, N. H.—The Colebrook, Stewartstown & Connecticut Lake Telephone Company is building a new line from Stewartstown to Colebrook on the Vermont side.

YOUNGSVILLE, PA.—John A. Day, of this place, is running an independent telephone line connecting Youngsville, Matthew's Run, Chandler's Valley, Sugar Grove and Farmington. The wires are now strung to Sugar Grove and communication already established. The other towns will be reached as soon as possible.

SPRINGFIELD, ILL.—The Secretary of State has granted a license to incorporate the Citizens' Telephone Company, of Peoria; capital, $200,000; incorporators, Deloss Brown, H. F. Farwell and John Skinner.

OAKLAND, MD.—A telephone line is projected from Friendsville, Garrett County, to Oakland via Accident and Hoyes; also from Cranesville, W. Va., to Oakland via Tang Run.

LOCKPORT, ILL.—The People's Telephone Company has been incorporated; capital, $12,000; incorporators, Allen G. Hawley, Charles B. Cheadle and Thomas A. Cheadle.

New Electric Railways.

DETROIT, MICH.—The Detroit & Pontiac Electric road will be extended to Owosso.

BEAUMONT, TEX.—John C. Ward and others have been granted a 50-year franchise for an electric railroad.

ROME, N. Y.—The Rome street railway is to be extended and run by electricity. Philadelphia capitalists are at the head of the enterprise.

ALBANY, N. Y.—The Columbia Traction Company has been incorporated under the laws of New Jersey, with a capital of $.00,000. The proposed road is to connect Hudson and Philmont. The officers are: President, Franklin G. Simmons; treasurer, William C. Allen; secretary, E. F. Foote. Mellenville and Claverack will also be connected.

TRADE NOTES.

The Western Electric Company, Chicago, has in stock a large and complete assortment of weatherproof sockets and receptacles for T.-H., Edison and Westinghouse bases. Orders for material of this kind will receive prompt attention.

The Berlin Iron Bridge Company, East Berlin, Ct., are erecting for the Seamless Metal Company, Sing Sing, N. Y., across the railroad tracks connecting the different parts of their plant a steel foot bridge. The bridge consists of lattice trusses about 68 feet long, supported on steel trestle bent on either end. Underneath the bridge is a substantial trolley beam designed to carry loads from the adjoining building to the switch track of the railroad underneath the bridge.

A representative of the ELECTRICAL REVIEW, through the kindness of the treasurer, Mr. H K. Gilman, was recently shown through the establishment of the Western Electrical Supply Company, of St. Louis. This company has become one of the most energetic of the mammoth electrical supply depots of the West and now occupies an entire building at 10 and 12 North Ninth street, quite in the heart of the city, surrounded by the most perfect facilities for prompt shipments. The company keeps in readiness, for immediate delivery, one of the largest and most comprehensive stocks of modern electrical equipments and supplies of every character. The Western Electrical Supply Company also acts as sole St. Louis agents for the Eddy Electric Manufacturing Company, Jno. A. Roebling's Sons Company, Adams-Bagnall Electric Company and the Warren Electric Manufacturing Company.

BONDS FOR INVESTMENT I have five (5) Electric Light coupon GOLD BONDS, 5 per cent. payable semi-annually (December 1 and June 1).

They can be had at par ($5,000) and accrued interest. This is a safe and solid investment. The net earnings of the company are nearly three (3) times the interest charges. City lighting for five (5) years. Perpetual franchise. I refer by authority to the Editor of the ELECTRICAL REVIEW. Address "H. D." care ELECTRICAL REVIEW, New York.
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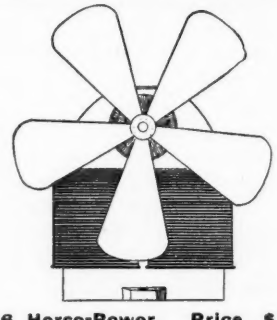

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Book of working drawings and instructions for building and winding given free with each set.
Hand Dynamo and Lamp, all ready to run, $3.50
Book telling how to make a 2-light Dynamo, 10c.
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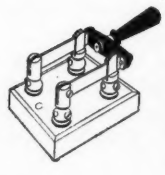
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CHICAGO PHILADELPHIA

Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED OCTOBER 18, 1898.

(Concluded.)

612,701 Igniter or sparker for gas, oil or vapor engines; F. W. Canfield, Manistee, Mich.

612,702 Automatic electrically controlled railway switch; R. V. Cheatham, Louisville, Ky.

612,708 Electric signaling apparatus; W. E. Decrow, Boston, Mass.—An electric signal transmitter, comprising a train, a box number, circuit-operating device operated by it to transmit a box-number signal at different speeds at every operation of the train, and an actuating lever for said train.

612,709 Electric signaling apparatus; W. E. Decrow, Boston, Mass.—An electric signal transmitter, comprising a train, two signal transmitting devices constructed and arranged to transmit their signals at different speeds at each operation of the train, and an actuating lever for said train.

612,781 Electric meter or indicator; W. D. Marks, Philadelphia, Pa.—An ampere indicator consisting of an actuating coil or coils, a permanently magnetized movable member and an extra winding or coil on said movable member.

612,789 Electric self-loading street-cleaning car; A. J. Reynolds, Worcester, Mass.

ISSUED OCTOBER 25, 1898.

612,810 Railway signal; William Andrews, London, England.

612,880 Electric contact box; J. N. Thomas, Johnstown, Pa.—A closed insulating vessel containing a switching mechanism, an electrode on each side of the top wall of the same, a conductor connecting said electrodes, and cushions between each electrode and the top of said vessel.

612,929 Insulator and hanger for electric railways; W. C. Keithly, San Francisco, Cal.

612,943 Electric furnace; Louis Bresson, Lyons, France—An oscillating crucible with means for operating it, carbon electrodes isolated from the body of the furnace and projecting into the crucible, and means for supporting said electrodes and for raising their extremities without changing the length of the arc.

612,977 Armature winding; A. L. Riker, New York, N. Y.—Composed of a number of turns of round wire forming a hexagonal figure having two straight parallel sides to occupy slots in the armature core, connecting parts in substantially the same plane as the sides, and a downward bend at each end of the coil, the latter being a thickness of two wires across the bend, and of one wire elsewhere.

612,979—Indication-box for switches; Jacob B. Struble, Wilkiosburg, Pa Consists of two contacts forming terminals of switch-indicating circuits, two movable contact blocks for closing said circuits, and means for shifting one of said blocks prior to the unlocking of the switch and the other block subsequent to the locking of the switch in its shifted position.

612,999 Electric lamp guard; H. M. Underwood, Chicago, Ill.

613,003 Steam-engine indicator; W. S. Andrews, Schenectady, N. Y.

613,036 Telephone exchange system; C. S. Heilman, Philadelphia, Pa.

613,046 Automatic leak or ground cut-out; W. L. Pratt, Adams, N. Y.—Comprises a hinged arm carrying looped connections, said arm being held normally in circuit by a fuse wire, a branch circuit to ground, condensers located said branch circuits, a magnet and an armature adapted to fuse said fuse wire when the leakage of current has sufficiently accumulated in the condensers so that a discharge to ground would occur.

613,054 Electric fan; D. L. Bates, Dayton, Ohio.

613,062 Thermostat; W. E. Facer, Cleveland, Ohio.

613,080 Telegraphy; C. D. Royse, Greencastle, Ind.

613,084 Underground electric railway; G. W. Smith, St. Louis, Mo —A car platform, a lever fulcrumed thereon, a conduit, a hanger operated by said lever and suspended in said conduit, a trolley wire, a flexible tube in said conduit and in which said trolley wire is located, a series of contact shoes placed in and at connection with said contact shoes.

613,090 Apparatus for producing radiation of electricity; C. H. Stearn, London, England—In a lamp or illuminating device for giving light by the action of cathode rays on an anti-cathode, the combination with an exhausted vessel, of a cathode within said vessel, an anti-cathode also within said vessel made of a material such as refractory oxid of thorium or other refractory oxids or earths which can be rendered incandescent by currents which are practically available for lighting purposes.

613,116 Dynamo-electric machine or motor; S. G. Brown, London, England—In a field magnet for a dynamo or motor, the combination of an outer portion having an extended pole-face, an inner portion magnetically distinct from said outer portion and having a contracted pole-face, and means for exciting said two portions.

613,128 613,129 Electric switch; W. Ely, Providence, R. I.

613,135 Alternating-current electric motor; A. S. Frazer, Tynemouth, England.

613,140 Cigar lighter; A. G. Gruhlke, Waterloo, Ind.

613,175 Underground electric railway system; F. D. Robb, Hot Springs, Ark.—A conduit comprising a sectional casing, means for uniting the sections of the casing, each of said sections having one of the sides of the curved body portion cut out longitudinally entirely through the same below and communicating with an upper trolley slot and a curved hinged door adapted to close or open the space formed in said cut-out portion.

613,177 Safety device for suspended conductors; J. N. Thomas, Johnstown, Pa.

613,203 Alternating-current motor system and method of operating same; W. Hutin, Paris, France—The method of starting a single-phase alternating current motor of the induction type which consists in opposing progressively-varying electromotive forces to the electro-motive forces existing in the circuits of the windings of its induced member so as to create therein a rotary field.

613,204 Alternating-current asynchronous machine; M. Hutin, Paris, France.

613,205 Electric current leveler; M. Hutin, Paris, France—As a means for reducing the alternating component of a complex current wave flowing in an electric circuit, a transformer provided with a primary in series with said circuit, and with a short-circuited high resistance secondary in inductive relation to said primary.

613,206 Method of and means for synchronizing; M. Hutin, Paris, France.

613,209 Alternating-current dynamo-electric machine; M. Leblanc, Paris, France.

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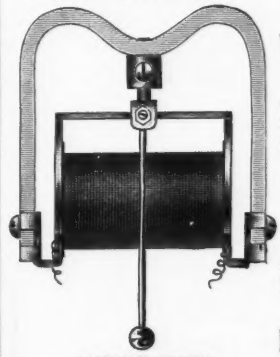

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Kindred.... ...Interests

The Cary Spring Works, of 240–242 West 29th street, New York city, are filling some large orders calling for their machinery and motor springs. The company are placing a very high grade of springs on the market, which are giving good satisfaction to the firms now using them.

Heber Wells, of 157 William street, New York city, is sending out among the trade some very handsome pattern letters for iron and brass castings. The letters are manufactured in any size or style desired, either flat, square or round type, and are so designed as to be especially adapted for the machinery intended.

The Western Telephone Construction Company, 250 to 254 South Clinton street, Chicago, is making great improvements and additions to its already extensive manufacturing facilities. A number of advantageous changes and improvements have also been made in its telephone apparatus.

The Western Electric Company, Chicago and New York, has distributed a number of its bulletins No. 7002, which are descriptive of arc lamps of its manufacture. Any person interested in the operation of an arc light plant, and who has not received a copy of this bulletin, will be sent one upon request.

A.O. Schoonmaker, the well known mica manufacturer of New York city, reports business in the West as picking up to a remarkable extent. The uncertainty of the war question having been in a large degree settled, the manufacturers are turning their attention more closely to business, and orders are coming in in a very pleasing way.

Within the past few months, the Missouri Edison Electric Light Company, of St. Louis, Mo., has placed not less than 700 General Electric single globe enclosed-arc lamps upon its alternating-current circuits. These are used for interior illumination and are giving very satisfactory service. They replaced 18-ampere, 36-volt open arc alternating lamps.

The Electric Appliance Company, Chicago, are meeting with great success in the sale of their combination fuse block and lightning arrester for telephone work. It seems to fill a large demand for an efficient device for protecting telephone apparatus, and the Electric Appliance Company have yet to hear of a single case where it has failed to operate in an entirely satisfactory manner.

A very durable brush-holder is being placed on the market by the Perfection Supply Company, of 621 Broadway, New York city. The holder is very simple in its construction, and being only made to order, care is taken with each particular brush to make it perfect in all its parts. As there is nothing to wear out, the spring does not lose its life, and it does not burn or become heated.

The Helios Electric Company, Philadelphia, through the Anchor Electric Company, their Boston agents, have received a large order from Jordan, Marsh & Company, Boston. It was only after protracted and severe tests of many prominent lamps on the market that the order was finally awarded to the Helios company. Large orders have also been received from abroad, taxing the facilities of the factory to their utmost.

The Becker Name-Plate Company, of 34 Oliver street, Boston, report a large increase of business during the month of October. The company are placing some very handsome designs on the market at a very reasonable price. The name-plates are made in any desired size or design, and are suitable for all sorts of machinery, motors, switchboards, etc. A very handsome souvenir in the shape of a paper cutter is being sent out by the company to all their customers.

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Bronxville, N. Y., U. S. A.

ACTIVE SOLICITORS WANTED EVERYWHERE for "The Story of the Philippines" by Murat Halstead, commissioned by the Government as Official Historian to the War Department. The book was written in army camps at San Francisco, on the Pacific with General Merritt, in the hospitals at Honolulu, in Hong Kong, in the American trenches at Manila, in the insurgent camps with Aguinaldo, on the deck of the Olympia with Dewey, and in the roar of battle at the fall of Manila. Bonanza for agents. Brimful of original pictures taken by government photographers on the spot. Large book. Low prices. Big profits. Freight paid. Credit given. Drop all trashy, unofficial war books. Outfit free. Address F. T. Barber, Sec'y, Star Insurance Bldg., Chicago.

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for all purposes where a safe and handy flash light is desired.
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Price, Complete, $3.00. By Mail, $3.30
Extra Battery, 30 cents. By Mail, 50 cents.
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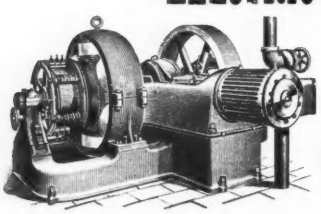
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